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Reducing short-term price variability in slaughter hogs

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REDUCING SHORT-TERM PRICE VARIABILITY IN SLAUGHTER HOGS

by

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INTRODUCTION

Basic agricultural supply and demand statistics are utilized to develop inferences for decision-making, structural quantification and forecasting. These areas are highly important for administrators of public agencies in formulating policy decisions and for guidance of decision makers in the livestock industry in promoting orderly production and marketing.

Recognizing the limitations of, and errors in, drawing inferences from the unrefined basic information, a market information program has been developed over the years as part of the farm outlook work of the state experiment stations and the U. S. Department of Agriculture. Some of these programs might be extended, however, to provide for the compilation of basic data, their analysis, interpretation and timely dissemination. Expanded programs of market information should enable the individual members of the livestock industry to make decisions more compatible with both personal and industry interests.

According to a House of Representatives subcommittee report on the U. S. Department of Agriculture and Related Appropriations, the Department of Agriculture could greatly assist hog producers by continuing to increase the accuracy of market forecasting. This committee believed that hog

producers could benefit by more stability in markets (15). It suggested that forecasting could be integrated with alternative forms of market organization, namely "existing market patterns," "alternative marketing patterns," or other alternative methods of price stabilization.

The Economic Problem

The importance of hogs as a source of farm income for the 12 Northcentral states is shown by the data in Table 1. The impact of price fluctuations on farm income is revealed by several statistical measures. For example, the coefficient of correlation (r) between the average prices paid farmers for hogs and the cash receipts for hog marketing during the 1950-59 period is 0.914. The regression coefficient for average price of hogs sold by farmers on cash receipts from hog marketing is 108.1495; that is, over the 1950-59 period there was a change of $108,150,000 in cash receipts for each dollar change in hog prices per hundred pounds. Moreover, the regression coefficient for the average price paid for hogs and the net farm income during the 1950-59 period was 206.532--showing a change of $206,532,000 in net farm income per dollar change in hog prices per hundred pounds, though the coefficient of correlation (r) was somewhat lower, 0.704.

Table 1. Selected data on hog marketing for 12 Northcentral states, 1950-59

Year	Average price of hogs sold by farmers (Dollars)	Hogs marketed by farmers (1,000 head)	Cash receipts from hog marketing (Mil. dol.)	Net farm income (Mil. dol.)
1950	18.08	58,309	2,606	6,061
1951	20.06	63,768	3,165	6,683
1952	18.42	64,568	2,808	6,407
1953	21.38	56,459	2,906	5,280
1954	21.54	54,886	2,892	5,718
1955	14.88	62,808	2,258	4,345
1956	14.38	63,665	2,157	4,637
1957	17.84	59,833	2,529	5,302
1958	19.68	59,899	2,808	6,141
1959	13.98	68,289	2,283	4,550

The market price which the Corn Belt farmer receives for hogs is a very important factor in determining net income. Therefore, to know what factors influence changes in hog prices that he may have a better knowledge of future prices is of some social significance. With more accurate knowledge, moreover, the producer may more effectively direct his production and marketing program to take advantage of favorable prices.

The problem studied in this dissertation is a more limited and specific problem in terms of time than the one suggested in Table 1; it is the existence of short-term hog price differentials which adversely affect quality improvement

of farm products and the income position of farmers. The distribution of receipts over time and between markets is chiefly responsible for week-to-week and day-to-day price changes and for changing differentials between markets. Moreover, a major concern of hog producers is the uncertainty of hog prices at the time of marketing. With such price uncertainty, the obtaining of maximum returns for any given quality of animal may be purely a matter of chance.

Evidence obtained from the livestock reports in the Des Moines Tribune and the Des Moines Register and from a mailed questionnaire to 74 types of market agencies shows the existence of spatial and temporal short-term hog price differentials. These data were analyzed through the method of analysis of variance. The data were obtained during a specified six-week period.[1] Figure 1 shows the location of the agencies selected through a stratified random sample.

Several null hypotheses were tested:

There were no significant differences for each weight class by weeks, areas and days in the average price of slaughter hogs in 74 Iowa markets for the specified six-week period referred to in the preceding paragraph.

From the details of the analysis of variance shown in the Appendix, the following conclusions can be reached:

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[1]September 14-19, 21-26, November 30-December 5, December 7-12, 1959, February 15-20, 22-27, 1960.

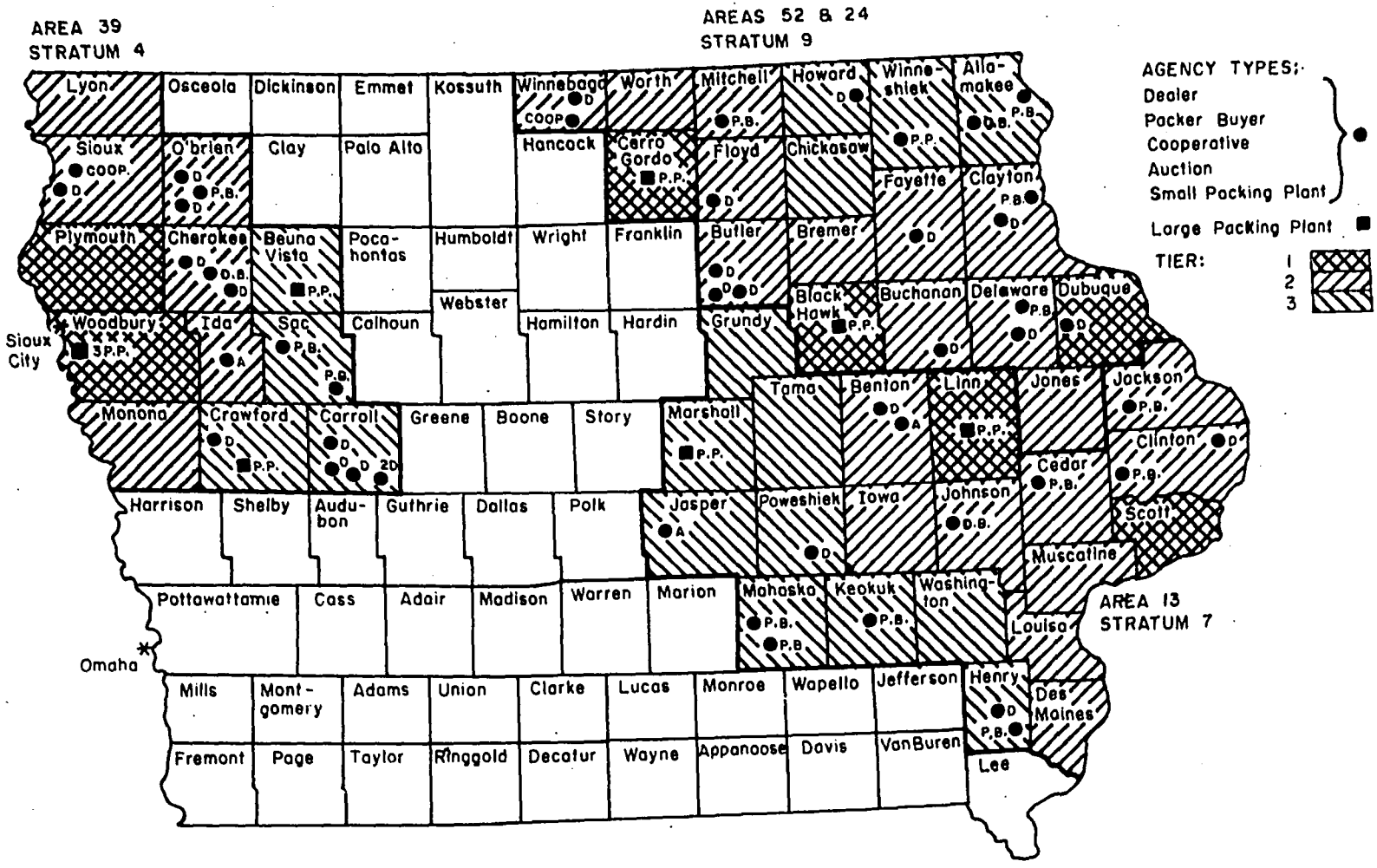


Figure 1. Location of sample agencies interviewed

1) The week-to-week differences are highly significant--consistently so for each class. The week-and-area interaction is highly significant for only the first weight class. The week-and-day interaction is highly significant for each weight class.

2) The area-to-area differences are highly significant for each of the four weight classes. The area-and-day interaction is highly significant for the first three weight classes.

3) The day-to-day differences are highly significant only for the last three weight classes.

A second null hypothesis was tested:

There were no significant differences in the average price per hundred pounds for each weight class by weeks, areas and days in the 74 Iowa markets, as determined by actual survey and similar average prices at Sioux City reported in the Des Moines Tribune and the Des Moines Register.

From the analysis of variance shown in the Appendix, the following conclusions can be reached:

1) The week-to-week differences are highly significant for each class.

2) The week-and-area interaction is highly significant for only three classes; in the 220-240 pound class no significance was found. The week-and-day interaction is highly significant for the same three classes as above.

3) The Sioux City prices and the average prices obtained in the six-week study of 74 markets are highly significant for the same three classes. The area-and-day interaction is highly significant for both the 180-200 pound and 200-220 pound classes.

4) The day-to-day variation is significant only for the 200-220 pound weight class.

A third null hypothesis was tested:

There were no significant differences in the average prices per hundred pounds for each weight class, by weeks, areas and days in the 74 Iowa markets, as determined by actual survey, and similar average prices reported in the Des Moines Tribune and the Des Moines Register for the groups of markets located in Interior Iowa and Southern Minnesota.

From the details of the analysis of variance shown in the Appendix, the following conclusions can be reached:

1) The week-to-week differences are highly significant--consistently so for each class. The week-and-area interaction is highly significant for each class. The week-and-day interaction is highly significant for each class.

2) The price differences in Interior Iowa and Southern Minnesota markets and the price differences obtained in the six-week study of 74 markets are highly significant for each class. The area-and-day interaction is highly significant for the first weight class and statistically significant for the

second and third weight classes.

3) The day-to-day differences are not significant for any of the four weight classes.

The spatial and temporal differentials are illustrated further by data obtained from the livestock reports in the Des Moines Tribune and Des Moines Register, covering the period December 29, 1958, to February 27, 1960. These data cover the following weight classes: 180-200, 200-220, 220-240, and 240-270 pounds (Figures 2, 3, 4, and 5).

The spatial and temporal price differentials were obtained for two terminal markets, Sioux City and Chicago, and the Interior (Iowa and Southern Minnesota) markets. According to these data, price relationships between markets changed considerably over the period of analysis. Price relationships between weight divisions of hogs were more stable at some seasons of the year than at others. Hog prices at the Interior Iowa and Southern Minnesota markets were consistently below the prices for the four weight classes at Sioux City and Chicago. On the other hand the hog prices at Sioux City were higher at times and lower at other times than Chicago's prices for the different weight classes. The temporal price differentials for hogs are clearly indicated by the seasons when supplies of hogs are at a minimum and maximum.

The hog market has shown wide price swings during the past several years. One measure of the variability of prices

Figure 2. Midpoint of daily slaughter hog prices for the 180-200 pound weight class for the markets located in Interior Iowa and Southern Minnesota, the Sioux City and Chicago terminal markets, August 25, 1959-February 25, 1960

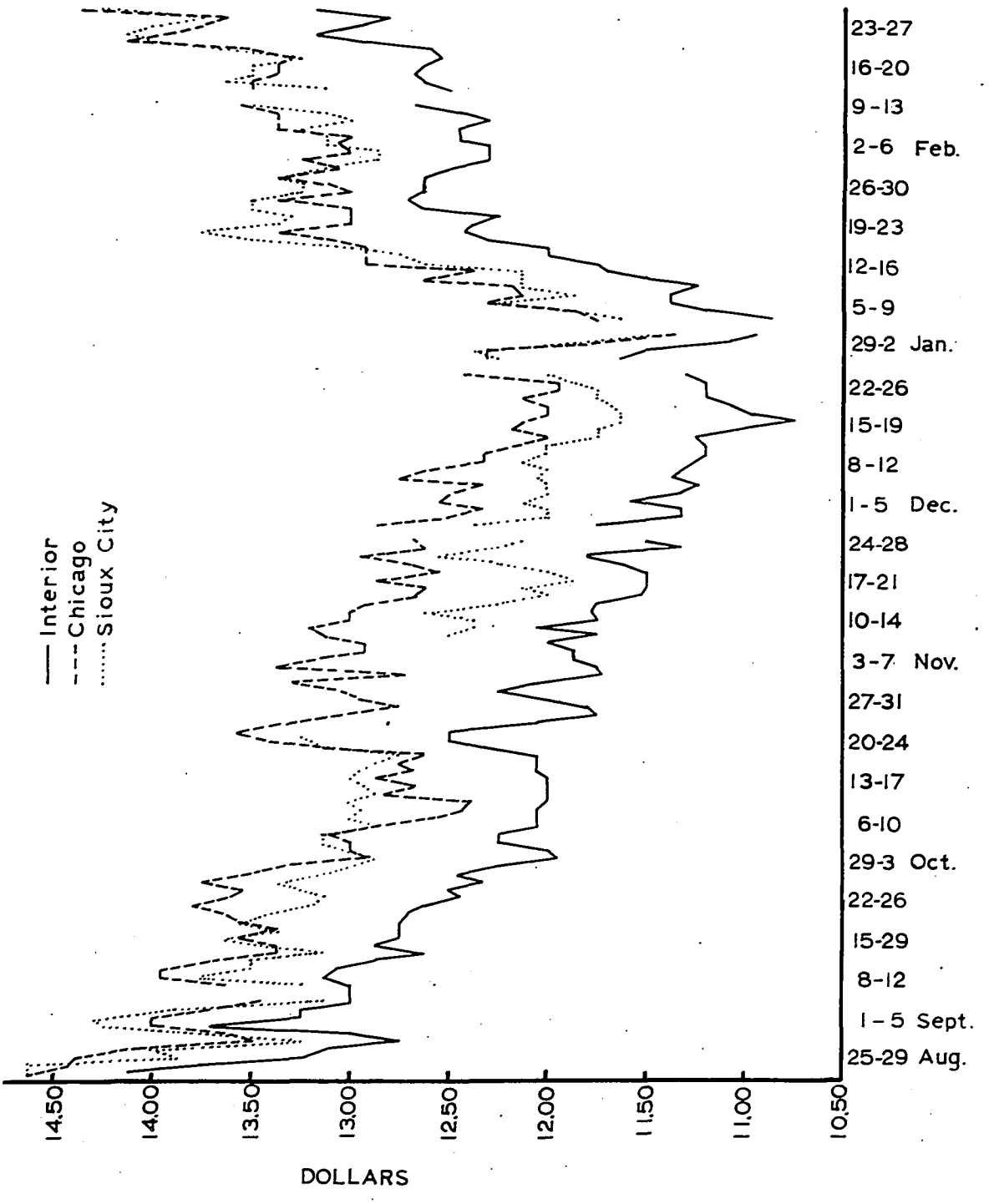
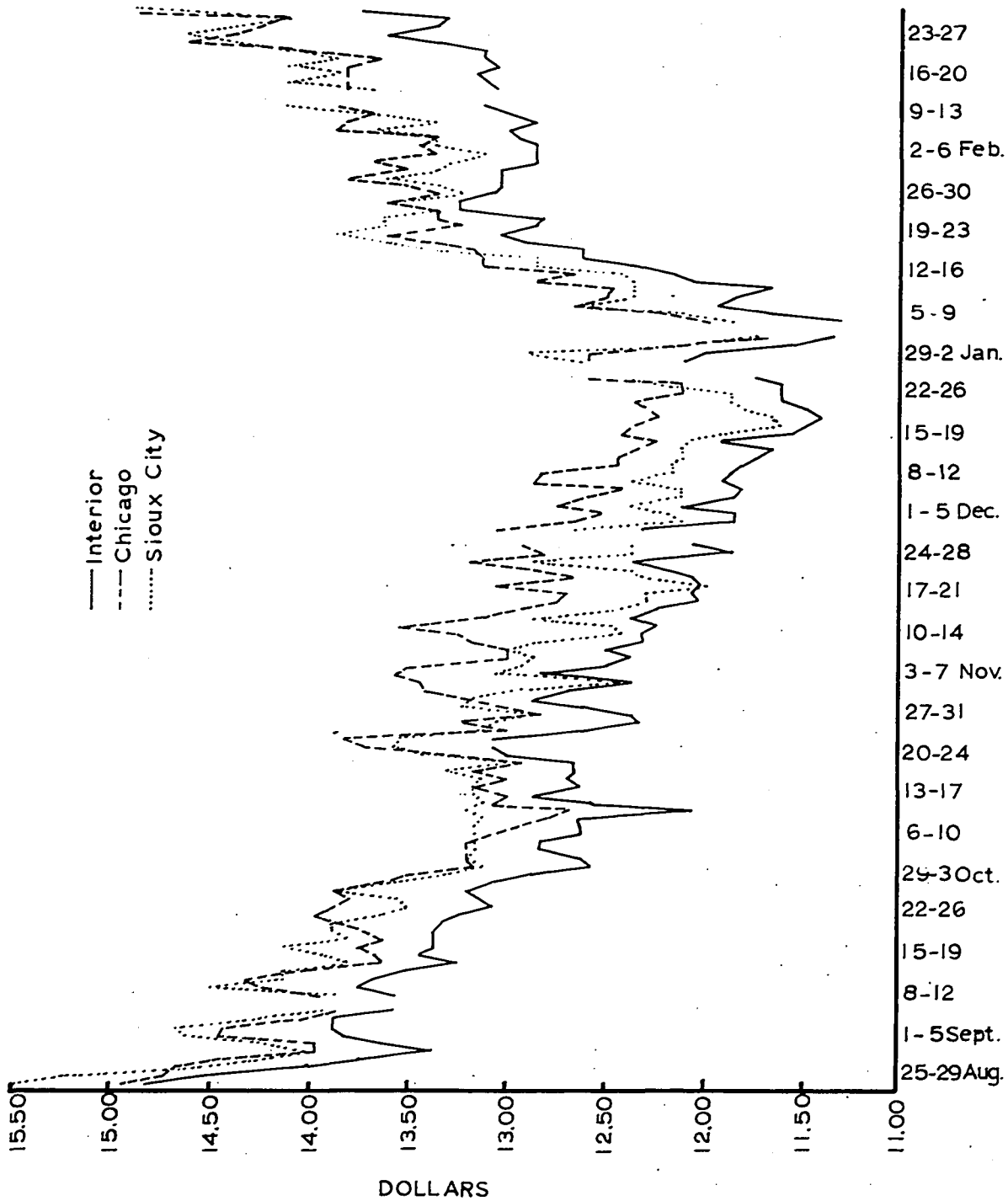

Interior
Chicago
Sioux City
23-27
16-20
9-13
2-6 Feb.
26-30
19-23
12-16
5-9
29-2 Jan.
22-26
15-19
8-12
1-5 Dec.
24-28
17-21
10-14
3-7 Nov.
27-31
20-24
13-17
6-10
29-3 Oct.
22-26
15-29
8-12
1-5 Sept.
25-29 Aug.
14.50
14.00
13.50
13.00
12.50
12.00
11.50
11.00
10.50
DOLLARS

Figure 3. Midpoint of daily slaughter hog prices for the 200-220 pound weight class for the markets located in Interior Iowa and Southern Minnesota, the Sioux City and Chicago terminal markets, August 25, 1959-February 25, 1960


Interior
Chicago
Sioux City
23-27
16-20
9-13
2-6 Feb.
26-30
19-23
12-16
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29-2 Jan.
22-26
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3-7 Nov.
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DOLLARS

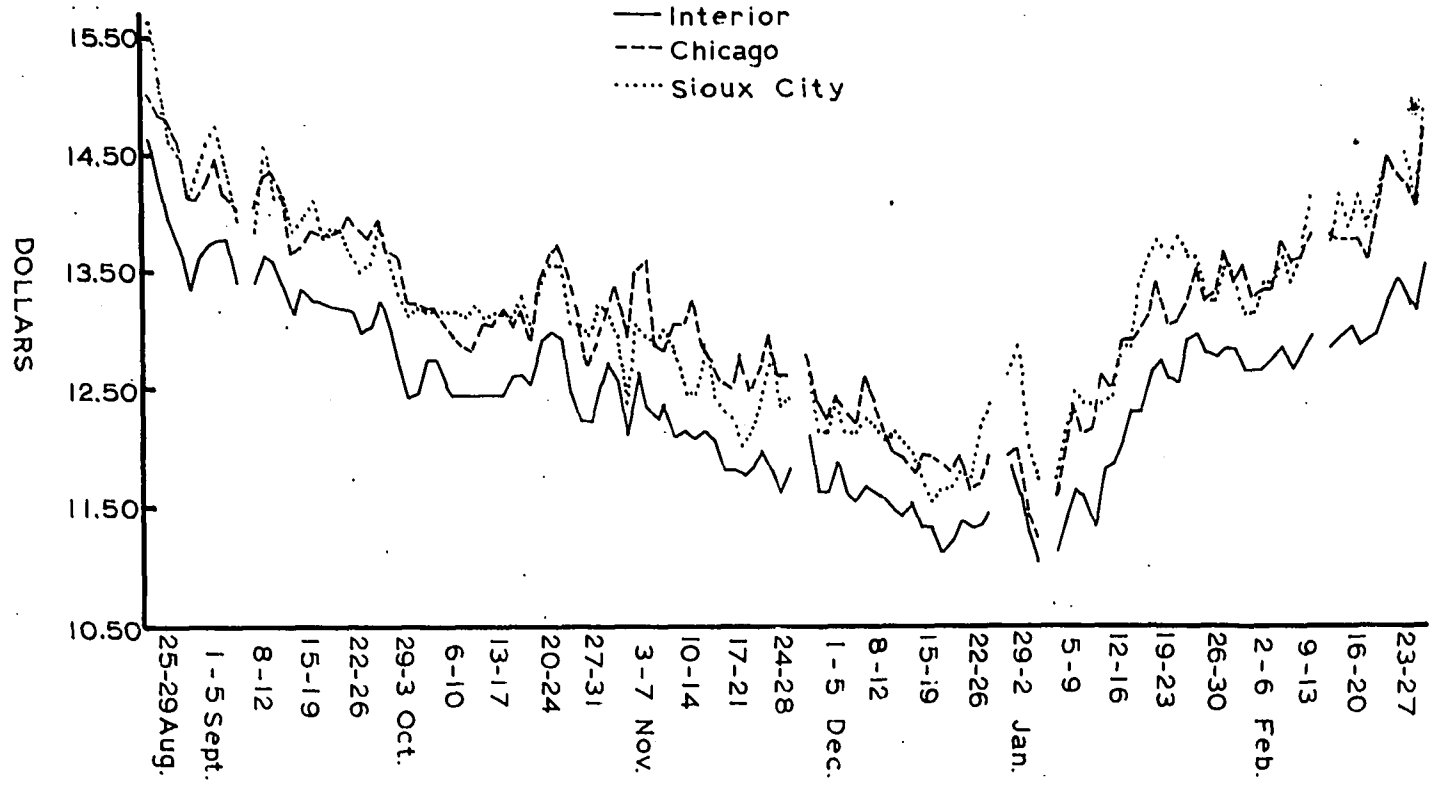

Figure 4. Midpoint of daily slaughter hog prices for the 200-240 pound weight class for the markets located in Interior Iowa and Southern Minnesota, the Sioux City and Chicago terminal markets, August 25, 1959-February 25, 1960

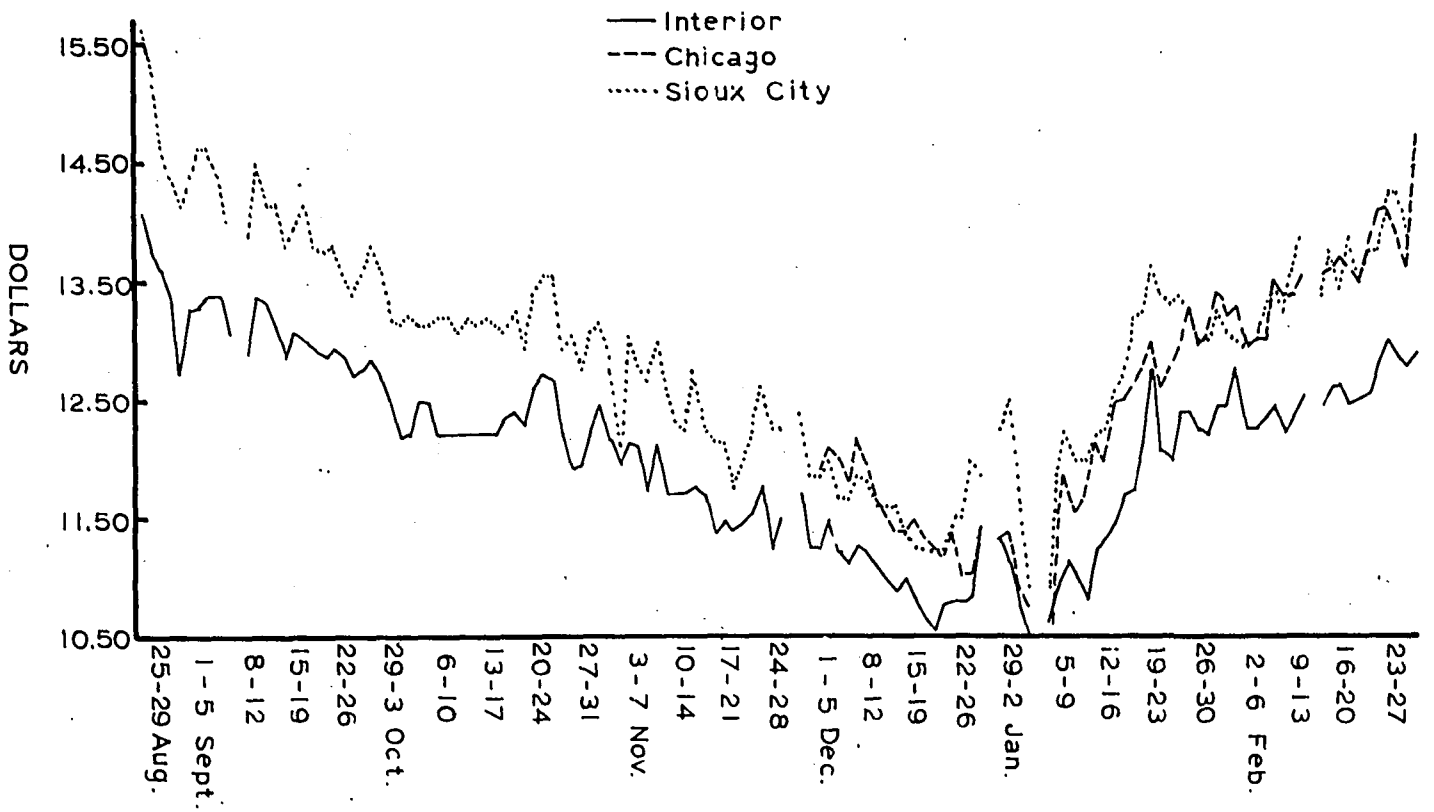

Figure 5. Midpoint of daily slaughter hog prices for the 240-270 pound weight class for the markets located in Interior Iowa and Southern Minnesota, the Sioux City and Chicago terminal markets, August 25, 1959-February 25, 1960

Table 2. Measures of variation in U.S. hog prices for selected periods for 200-220 pound barrows and gilts at Chicago, Interior Iowa, and Southern Minnesota markets

Period	Standard deviation s (dollars per cwt.)	Mean $\bar{x}$ (dollars per cwt.)	Coefficient of variation[a] C (per cent)
Annual, 1949-58[b]	2.4207	19.8690	12.18
Weekly, 1959 (52 weeks)	1.6999	15.2500	11.15
Daily, 1959-60[c]	0.7053	13.5100	5.22

[a]The coefficient of variation (C) is defined as follows:

$$C = \frac{s}{\bar{x}} .100.$$

The standard deviation of a series X is s, while $\bar{X}$ is the mean of the series. The coefficient of variation expresses the standard deviation as a per cent of the mean and measures the relative variation between series which are unlike in magnitude or in units of measure.

[b]Deflated by index of wholesale prices, all commodities.

[c]September 14-19, 21-26; November 1-5, 7-12; February 15-20, 22-27.

is the coefficient of variation (C). The coefficient of variation was 13.06 per cent for all hog prices at the farm level for the period 1949-58. Table 2 indicates the importance of cyclic variation in hog prices by showing the somewhat larger variations in the prices for the 200-220 pound

pound barrows and gilts at the specified markets using annual data rather than weekly or daily data. The coefficient of variation showed a decrease from 12.18 per cent for the annual data to 11.15 per cent for the weekly data in 1959. Finally, there was a variation of only 5.22 per cent in the data for the daily prices over the sampled six-week period. Nevertheless, public administrators, legislators, economists and farmers express concern about short-term as well as long-term variability in hog prices. The variations of 5 to 10 per cent and more are sufficient to concern persons interested in maximizing returns to the livestock industry.

Objectives of Study

The specific objectives of the study were: 1) to describe the short-term demand and supply structure for pork, 2) to ascertain quantitatively the association between short-term, or weekly, variability in the hog market and quarter-year variability in the same market and to account for the week-to-week variability during any one quarter year, and 3) to relate the quantitative findings to alternative procedures for reducing the undesirable effects of short-term market variabilities in slaughter hogs.

The research objectives were handled by the following procedure. First, objective one was achieved by constructing

a series of multiple variable equations of the livestock-meat economy. Second, objective two was achieved by examining the explained and also the unexplained variation in the dependent variable in each equation. Third, the quantitative findings were related to alternative procedures for reducing the undesirable effects of short-term market variabilities in slaughter hogs. Procedures for improving market information and for establishing market contracts were examined and evaluated in terms of both individual and group decision-making.

Short-term market variability in marketings contributes to uncertainty in decision-making and hence to the magnitude of the marketing adjustments with reference to changing supply and demand conditions. A high degree of price variability during certain critical months of the year, for example, affects the size of the hog enterprise and the level of hog production. In addition, seasonal marketing patterns, if production oriented, may vary because of changes in the pattern of short-term price and supply prospects. Market-oriented seasonality in marketings, moreover, may be modified because of the inventory adjustments to short-term changes in market prices and supplies. To relate the short-term changes in prices and supplies to the longer-run changes in the livestock markets, an analytical approach was developed that includes both quarterly and weekly variables.

ANALYTICAL APPROACH

Hypotheses

Within the framework of existing marketing patterns, short-term market forecasting offers reasonably good possibilities for removing some of the spatial and temporal imperfections which cause short-term price differentials for hogs. Marketing forecasting would improve the efficiency of decision-making for both individuals and complementary forms of joint decision-making.

Reliable and more complete information on expected weekly and daily hog supplies would remove much of the short-term uncertainty facing hog producers in their marketing decisions. Some of the surplus and shortages in supplies that now occur would be eliminated and that should result in more stable prices. Reasonably precise estimates would permit the Interior Iowa market to function under conditions more nearly approximating a perfect market, in which all buyers and sellers are better informed of market conditions. If advance estimates of supplies are to be of maximum value, however, hog producers need some specific knowledge of the quantity-price effects so as to be able to translate supply information into definite price expectations for their product. A knowledge of demand factors, too, is essential in

forming correct price expectations.

To empirically test the series of hypotheses regarding the reduction of short-term price variability, an existing quarterly model of the livestock economy was extended to cover weekly pricing phenomena. The data in the weekly model, and their use for short-term forecasting, are discussed in the remainder of this chapter.

Empirical Procedures

In the Maki-Liu study (11) that is a frame of reference for the estimation of supply and demand relationships for this study, livestock prices were generated by derived demand functions for each of the major livestock species. The latter were based on wholesale demand relationships which included per capita income, and annual trend as explanatory variables. Commercial supplies of the major meat products were derived from estimates of livestock on hand January 1. The latter forecasts were derived from statistical relationships depicting livestock on hand January 1 as a function of specified livestock prices for one or more preceding time periods.

Economic model of short-term variability in slaughter hogs

All segments of the livestock industry are concerned about the effectiveness of the pricing process as it relates

consumer preferences back to the livestock producer and as it facilitates resource allocation in time, place and form. Because of day-to-day and week-to-week variability in the livestock markets, however, individual livestock producers are penalized or incur unexpected gains as the prevailing market price falls or rises in response to short-term changes in supply and demand conditions. To errors in grading, therefore, must be added the errors and the uncertainties in pricing because of market fluctuations. In addition, the variability in day-to-day receipts at packing plants increases handling and slaughtering costs because of the larger force required to handle the peak daily receipts.

To study the effects of short-term market variability on the efficiency of market operations dealing with slaughter hogs, a series of studies was undertaken which served as an introductory phase of the current research project of the North Central Livestock Marketing Research Committee.

First, the effects of year-to-year market variabilities on efficiency in the meat industry were examined in terms of a series of prediction equations depicting the internal mechanism of the cattle and hog cycles.

The analytical approach used here has two separate models pertaining to weekly market variability, namely, an aggregate model depicting weekly price and quantity changes on a national level and a regional model. In the regional

model, the dependent variables in the national model become explanatory variables to explain week-to-week changes in specified regional prices and marketings. Only the West North Central region, including the Interior markets, is covered by the regional analysis.

Figure 6a shows the economic relationships that are considered in the supply-demand equations of the aggregate model for this study.

The aggregate model shows the transition from the quarter-year to the week. On the demand equation the difference between the average quarterly and the weekly price of the 200-220 pound barrows and gilts at Chicago is a function of the difference between average weekly and quarterly hog and cattle slaughter averaged over 13 weeks. In the supply equation federally inspected slaughter is a function of federally inspected slaughters the preceding week and the difference between weekly and quarterly hog prices.

Figure 6b shows the supply-demand relationships for the regional model of this study. The exogenous, endogenous and minor variables are shown for this model. In the demand equation, weekly prices at Chicago, Sioux City and Interior markets are a function of the price of the 200-220 pound barrows and gilts at Chicago and federally inspected slaughter. In the supply equations receipts are a function of time and the difference in price between the 200-220 pound weight

Figure 6a. An aggregate model showing the supply and demand relationships from the quarter-year to the week for hogs and cattle

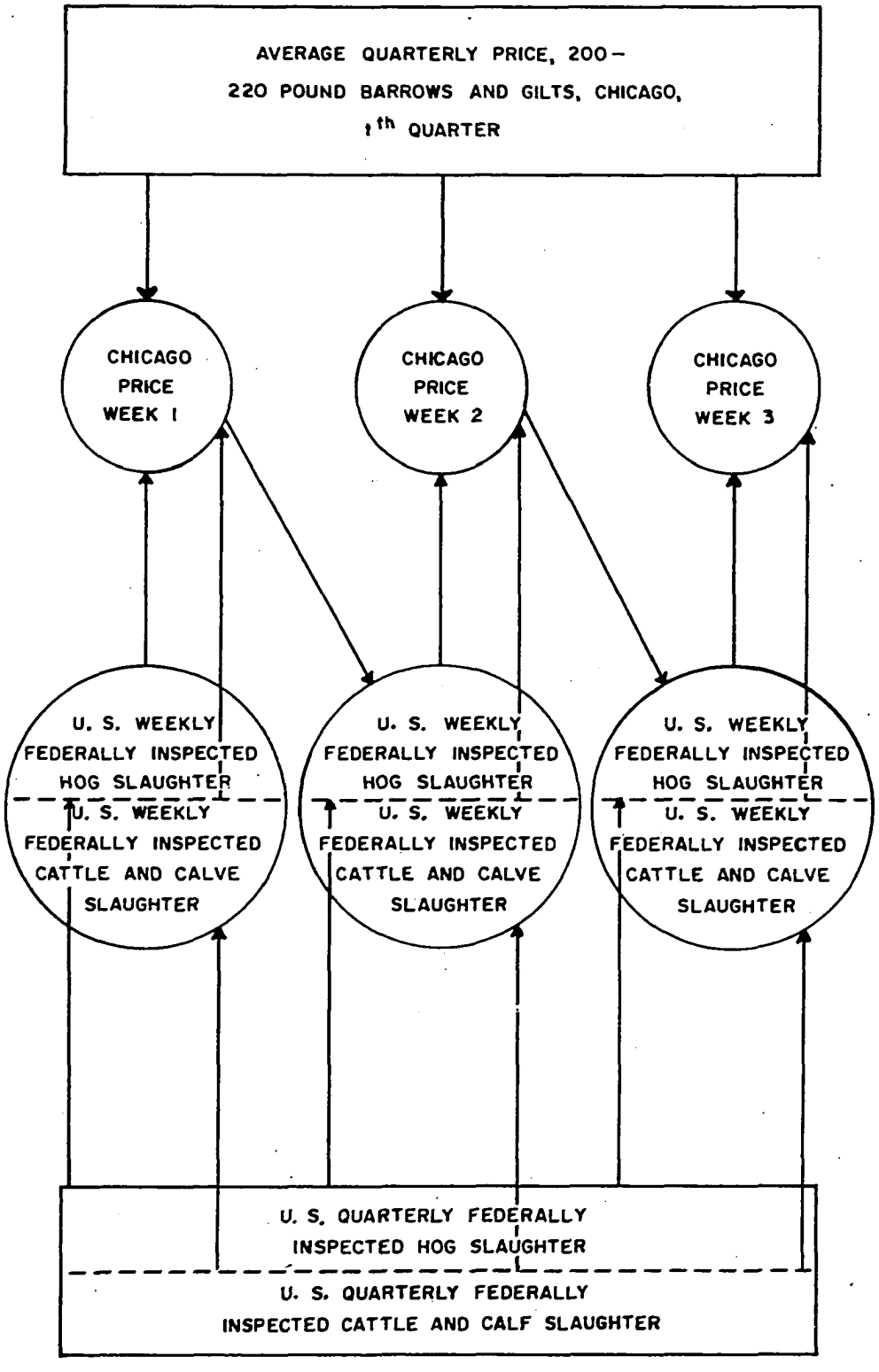
AVERAGE QUARTERLY PRICE, 200 – 220 POUND BARROWS AND GILTS, CHICAGO, 1th QUARTER
CHICAGO PRICE WEEK 1
CHICAGO PRICE WEEK 2
CHICAGO PRICE WEEK 3
U. S. WEEKLY FEDERALLY INSPECTED HOG SLAUGHTER
U. S. WEEKLY FEDERALLY INSPECTED CATTLE AND CALVE SLAUGHTER
U. S. WEEKLY FEDERALLY INSPECTED HOG SLAUGHTER
U. S. WEEKLY FEDERALLY INSPECTED CATTLE AND CALVE SLAUGHTER
U. S. WEEKLY FEDERALLY INSPECTED HOG SLAUGHTER
U. S. WEEKLY FEDERALLY INSPECTED CATTLE AND CALVE SLAUGHTER
U. S. QUARTERLY FEDERALLY INSPECTED HOG SLAUGHTER
U. S. QUARTERLY FEDERALLY INSPECTED CATTLE AND CALF SLAUGHTER

Figure 6b. A regional model showing the supply and demand relationships for hogs

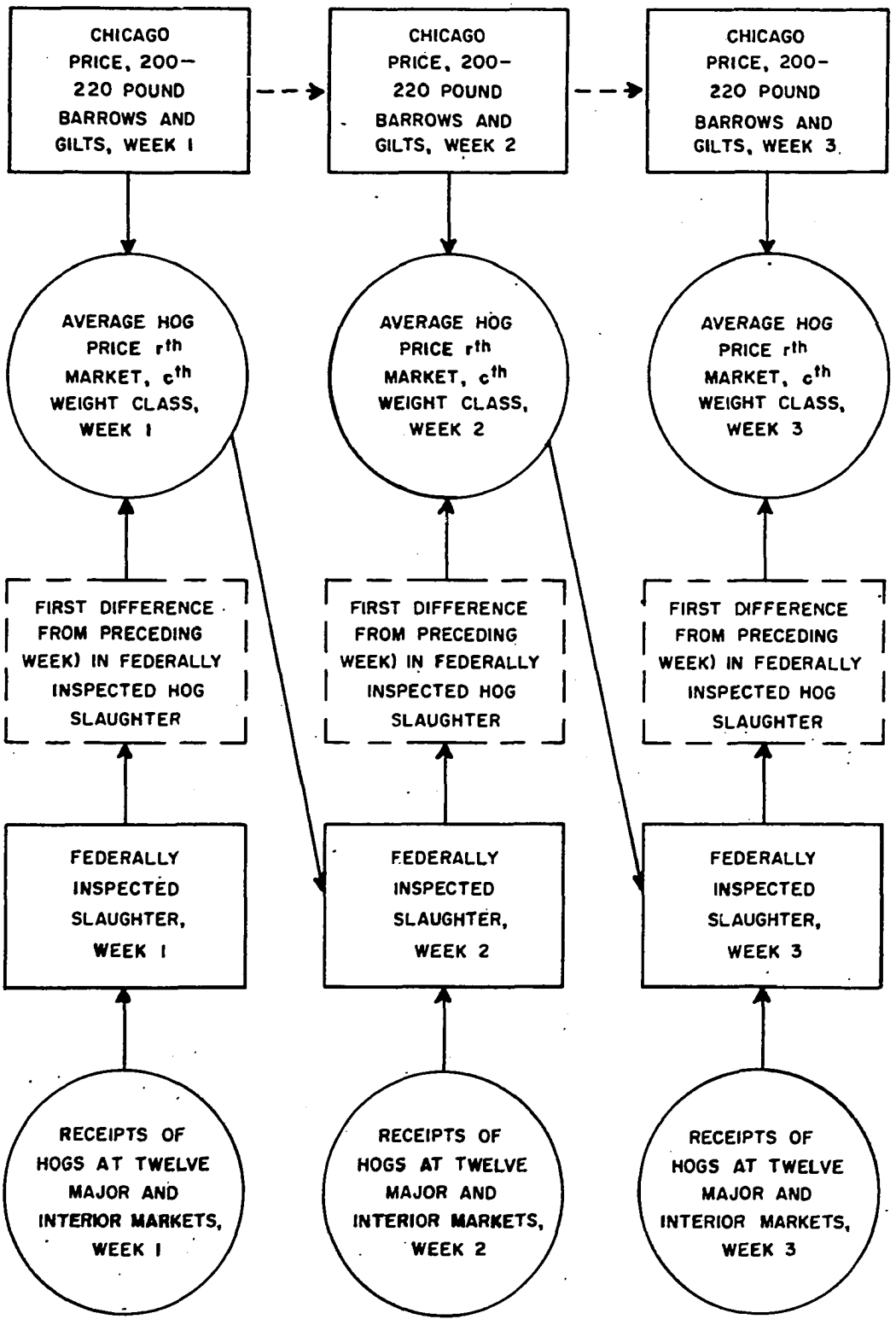
CHICAGO PRICE, 200–220 POUND BARROWS AND GILTS, WEEK 1
CHICAGO PRICE, 200–220 POUND BARROWS AND GILTS, WEEK 2
CHICAGO PRICE, 200–220 POUND BARROWS AND GILTS, WEEK 3
AVERAGE HOG PRICE r^{th} MARKET, c^{th} WEIGHT CLASS, WEEK 1
AVERAGE HOG PRICE r^{th} MARKET, c^{th} WEIGHT CLASS, WEEK 2
AVERAGE HOG PRICE r^{th} MARKET, c^{th} WEIGHT CLASS, WEEK 3
FIRST DIFFERENCE FROM PRECEDING WEEK) IN FEDERALLY INSPECTED HOG SLAUGHTER
FIRST DIFFERENCE FROM PRECEDING WEEK) IN FEDERALLY INSPECTED HOG SLAUGHTER
FIRST DIFFERENCE FROM PRECEDING WEEK) IN FEDERALLY INSPECTED HOG SLAUGHTER
FEDERALLY INSPECTED SLAUGHTER, WEEK 1
FEDERALLY INSPECTED SLAUGHTER, WEEK 2
FEDERALLY INSPECTED SLAUGHTER, WEEK 3
RECEIPTS OF HOGS AT TWELVE MAJOR AND INTERIOR MARKETS, WEEK 1
RECEIPTS OF HOGS AT TWELVE MAJOR AND INTERIOR MARKETS, WEEK 2
RECEIPTS OF HOGS AT TWELVE MAJOR AND INTERIOR MARKETS, WEEK 3

Table 3. Description of variables; cattle, calves and hogs

	Variable X_i	Units of measure	Description
1[a]	$P'_{3wt} - P'_{3t}$	Dols. per cwt.	Difference between average weekly price of hogs, w-th week, t-th quarter and average quarterly price of hogs
2-3[b]	$Q'_{iwt} - \frac{Q'_{it}}{k_t}$	1,000 head	Difference between federally inspected slaughter, w-th week, t-th quarter and average quarterly federally inspected slaughter: i=1, cattle; i=2, calves; i=3, hogs
4[b]	Q'_{3wt}	"	Federally inspected slaughter hogs, w-th week, t-th quarter
5[b]	$Q'_{3(w-1)t}$	"	Federally inspected slaughter hogs, preceeding week, t-th quarter
6[a]	$P'_{3(w-1)t} - P'_{3t}$	Dols. per cwt.	Difference between average weekly price of hogs, preceeding week, t-th quarter and average quarterly price of hogs

[a]Based on data from U. S. Dept. Agr. (12, p. 7).

[b]Based on data from U. S. Dept. Agr. (16).

Table 3. (Continued)

	Variable X_i	Units of measure	Description
7-18[b]	$P'^{r,c}_{3wt}$	Dols. per cwt.	Average weekly price of hogs, w-th week, t-th quarter at r-th market, c-th weight class: r=1, Chicago; r=2, Sioux City; r=3, Interior; c=1, 180-200; c=2, 200-220; c=3, 220-240; c=4, 240-270
19[b]	$Q'_{3wt} - Q'_{3wt-1}$	1,000 head	Change in federally inspected slaughter hogs from previous week, t-th quarter
20-21[b]	Q'^{r}_{3wt}	"	Total hog receipts, w-th week, t-th quarter at r-th markets: r=3, Interior; r=4, 12 markets
22	T	--	Time, denoting consecutive quarter periods starting with first quarter of each year: T=1
23[b]	$P'^{3,2}_{3(w-1)t} + P'^{3,2}_{3(w-2)t}$	Dols. per cwt.	Average weekly price of hogs, 200-220 pound weight class, Interior market, last week over preceeding week, t-th quarter

class in Interior markets, last week over the preceding week. The dependent variables of the aggregate model become the independent variables in the regional model.

Aggregate model

The aggregate model depicting price and quantity changes for the national market in slaughter hogs is composed of two parts, namely, a price prediction equation and a quantity prediction equation. In both equations the dependent or explanatory variables are the difference between the reported weekly and quarterly average price for the 200-220 pound weight class of barrows and gilts at Chicago and the difference between weekly federally inspected slaughter and the reported average weekly federally inspected slaughter over a 13-week period.

Demand relationships The United States estimates were based on the difference between the reported weekly price, and the reported average quarterly price of the 200-220 pound weight class of barrows and gilts at Chicago, and the difference between the weekly and quarterly federally inspected slaughter data for a 5-year period, 1955-59, as shown in the Appendix. To the computation on the weekly data, a transition was made in the equation directly from the quarterly to the weekly period. Using k_t = 13 (weeks) for all quarters, the live price equation expressed algebraically was,

$$P'_{3wt} - P'_{3t} = a + b_{11}\left(Q'_{3wt} - \frac{Q'_{3t}}{k_t}\right) + b_{12}\left(Q'_{1,2wt} - \frac{Q'_{1,2t}}{k_t}\right), \qquad (1)$$

where

P'_{3wt} = reported weekly price for the w-th week, t-th quarter of the 200-220 pound weight class of barrows and gilts at Chicago.

P'_{3t} = average quarterly price for the same weight class at Chicago.

Q'_{iwt} = federally inspected slaughter (i = 1,2, cattle and calves; i = 3, hogs) for the w-th week, t-th quarter.

Q'_{it} = federally inspected slaughter (i = 1,2, cattle and calves; i = 3, hogs) for the t-th quarter.

k_t = number of weeks in t-th quarter, i.e., 13.

The regression coefficients, b_{11} and b_{12}, specified the b_{11} units and b_{12} units change in $(P'_{3wt} - P'_{3t})$ of a 1-unit change, respectively, in $\left(Q'_{3wt} - \frac{Q'_{3t}}{k_t}\right)$ and $\left(Q'_{1,2wt} - \frac{Q'_{1,2t}}{k_t}\right)$.

A description of each variable with respect to time--such as Q'_{3wt}, which denotes a supply variable for the w-th week, t-th quarter--appears in Table 3. The sources of data are also listed.

The variables were computed from data compiled Monday through Friday sales, omitting Saturdays and holidays. The weekly data are available on the following Tuesday. The

average quarterly price of pork included the 200-220 pound weight class of barrows and gilts at Chicago.

Supply relationships Federally inspected slaughter was estimated on a weekly basis for a 5-year period, 1955-59. In algebraic form, the supply equation was,

$$Q'_{3wt} = a_{10} + b_{11} Q'_{3(w-1)t} + b_{12} (P'_{3(w-1)t} - P'_{3t}), \qquad (2)$$

where

$Q'_{3(w-1)t}$ = federally inspected slaughter hogs, preceding t-th quarter.

$P'_{3(w-1)t}$ = average weekly hog price of the preceding week, t-th quarter.

P'_{3t} = average quarterly price of hogs.

Thus, b_{11} and b_{12} denote the units change in Q'_{3wt} of a 1-unit change in $Q'_{3(w-1)t}$ and $(P'_{3(w-1)t} - P'_{3t})$, respectively.

A description of each variable contained in the supply equations is shown in Table 3. With reference to the timeliness of the data used in the prediction equation, at the present time daily estimates of supplies of saleable livestock are reported by all of the livestock market news offices. These estimates are released about 6:30 A.M. each market day and include the number of livestock on hand plus anticipated arrivals during the day. A report on estimated

saleable receipts at twelve major markets[1] is released from Chicago with totals for the same day, the previous week, and a year ago.

To predict each of the variables for future time periods, the listed independent variables were related to the specified dependent variables by a mathematical equation of linear form. The method of least squares was used to derive the regression coefficients.

Regional model

On the price equations of the regional model, weekly prices at specified markets for specified classes of hogs are essentially a function of the price of 200-220 pound barrows and gilts at Chicago during the same week. In addition the change from the preceding week in the quantity of federally inspected slaughter hogs was presumed to affect the weekly price levels.

The first regional supply estimates depicted the total weekly hog receipts for twelve markets as a function of federally inspected slaughter and time. The second regional supply estimate depicted the total weekly hog receipts for the Interior markets as a function of federally inspected

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[1]Chicago, Sioux City, Omaha, Kansas City, South St. Joseph, St. Louis National Stockyards, Cincinnati, Denver, Fort Worth, Oklahoma City, Indianapolis, and South St. Paul.

slaughter, quarter, and the difference in price between the 200-220 pound weight class in Interior markets, last week over the preceding week.

Demand relationships The regional demand estimates were based on weekly data for a 5-year period, 1955-59, as shown in the Appendix. Expressed algebraically the live price equation was of the form,

$$P'^{r,c}_{3wt} = a + b_{11} P'^{1,2}_{3wt} + b_{12} (Q'_{3wt} - Q'_{3wt-1}), \qquad (3)$$

where

$P'^{r,c}_{3wt}$ = average weekly price of hogs for the -th week, t-th quarter at the r-th market (r = 1, Chicago; r = 2, Sioux City; r = 3, Interior) and the c-th weight class (c = 1, 180-200 pounds; c = 2, 200-220 pound, c = 3, 220-240 pound; c = 4, 240-270 pound). This did not include $P'^{1,2}_{3wt}$, the 200-220 pound weight class at Chicago.

$P'^{1,2}_{3wt}$ = average weekly price of hogs for the w-th week, t-th quarter at Chicago, 200-220 pound weight class.

$Q'_{3wt} - Q'_{3wt-1}$ = change in federally inspected slaughter from the previous week, t-th quarter.

A description of each variable contained in the demand equations is shown in Table 3. The sources of data are also listed in the same table. These data are usually available within three days after the close of each week.

Supply relationships The regional supply estimates were based on weekly data as shown in the Appendix. Expressed algebraically the supply equations were of the form,

$$Q'^{4}_{3wt} = a + b_{11} Q'_{3wt} + b_{12} T, \quad (4)$$

$$Q'^{3}_{3wt} = a + b_{11} Q'_{3wt} + b_{12} T + b_{13} (P'^{3,2}_{3(w-1)t} \div P'^{3,2}_{3(w-2)t}), \quad (5)$$

where

Q'^{r}_{3wt} = Total weekly hog receipts for the r-th markets (r = 3, Interior markets; r = 4, 12 markets), t-th quarter.

Q'_{3wt} = federally inspected slaughter, w-th week, t-th quarter.

T = quarter (1,2,3,4).

$P'^{3,2}_{3(w-1)t} \div P'^{3,2}_{3(w-2)t}$ = difference in price, 200-220 pound, Interior market last week (w-1) over preceding week (w-2), t-th quarter.

Data covering the period from 1959 to 1960 were employed

in the testing of the economic models described earlier. A separate set of coefficients was derived on weekly data for each of the following years: 1955, 1956, 1957, 1958, and 1959. The derived relationships based on these data were then adjusted to provide a new set of empirical coefficients for predicting weekly prices and marketings during 1960.

A description of each variable contained in the supply equations is shown in Table 3. The sources of data are also listed in the same table. These data are usually available within three days after the close of each week. There are, however, several reports available to livestock producers which indicate future hog supplies on the Interior market. Most of the information is useful in long-range decision-making for breeding and feeding adjustments rather than for making marketing decisions. Advance estimates are made for the following day's marketings for several of the larger Midwest markets.[1] These estimates are released around noon Monday through Thursday. The advance estimates are based on marketings of recent weeks, current demand and price trends, weather, and road conditions.

Each trading day, the Federal-State Market News office at Des Moines releases an estimate of total hog marketings anticipated for the current day on the Interior markets.

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[1]Chicago, Sioux City, Omaha, Kansas City, South St. Joseph, St. Louis National Stockyards, and South St. Paul.

Information is obtained each morning from thirteen packing plants and thirty concentration yards on anticipated hog receipts. This report is the only short-term estimate of current supplies now being released on Interior hog marketings.

Literature Related to the Economic Models

The literature relevant to the economic models will be discussed under three subdivisions: (1) factors affecting supply, (2) price and sales forecasting equations, and (3) theory and assumptions.

Factors affecting supply

Schrader (12) determined that the most important factors influencing farmers' decisions to increase or decrease hog production were 1) the favorableness of prospective hog prices relative to feed-grain prices, 2) the quantity of grain relative to feeding, and 3) the intensity of farmers' desires to increase their cash income. He used a regression analysis to estimate the change in Canadian slaughter from the previous year, and the change in the number of sows expected to farrow between December 1 and May 31. For estimating the change in hog slaughter he obtained a corrected coefficient of multiple determination, R^2, of 0.92. For

estimating the number of sows expected to farrow between December 1 and May 31 he obtained the corrected coefficient of multiple determination, R^2, of 0.90.

Brandow (2), in August, 1956, published an estimate of the sows to farrow in the spring and fall seasons. He used a multiple regression analysis. Among the variables used was the ratio of spring farrowings to total farrowings during the preceding spring and fall seasons, expressed as a percentage of trend during the years 1926-41 and as a percentage of average during the years 1947-56. The years 1929-56 were incorporated in the analysis, except the war years 1942-45.

Independent variables included in Brandow's spring model were as follows:

1) Average hog-corn price ratio during the previous October through December, computed from prices received by United States farmers;
2) first difference of the total production of oats, barley, and sorghum grains, expressed as a percentage of corn production (production in tons);
3) "dummy" variable having the value of zero in the period 1926-41 and 1.0 in the period 1947-56.

A good fit was obtained with these variables, especially during the post-war years. The corrected coefficient of multiple determination, R^2, was 0.83.

The dependent variable for the fall season was the ratio

of fall farrowings to total farrowings in the spring and fall seasons of the previous year, expressed as a percentage of trend.

The independent variables for the fall season include:

1) number of sows farrowed in the previous spring;
2) July hog-corn ratio;
3) "dummy" variable similar to the one used in the spring model.

The coefficient of determination, R^2, was 0.81, but it was necessary to omit the years 1934, 1935, 1937, 1942-46, and 1948 to obtain it.

Kohls and Paarlberg (9) presented evidence that an average of corn prices in September through November was the most important factor in explaining the variation in sows farrowed during the spring season. Average hog prices in September through November were found to be of lesser importance but still were significant. When considered together, they explained 75 per cent of the total variability, whereas the hog-corn ratio, as such, explained only 59 per cent of the total variability.

Fall farrowings were most dependent upon spring farrowings. Corn and hog prices in this case were insignificant separately, but the hog-corn ratio was significant. Using spring farrowings, together with the average hog-corn ratio during March through May, 52 per cent of the variation in

fall farrowings was explained. Kohls and Paarlberg based their models on the years 1925-42 inclusive.

Wright (19) obtained evidence that there is a relationship between the hog-corn ratio and the subsequent number of sows farrowed. His contention was that corn supplies, corn prices, hog prices, and hog supplies formed an interrelated system upon which hog production was largely dependent.

Wells (17) in a report published in 1933 pointed out that the hog-corn ratio is the most important of the feeding ratios because, relative to other grains, more corn is fed to hogs. The barley-hog ratio, however, is of greater importance on the Pacific coast. Wells concluded that farmers vary their hog production from year to year in response to the hog-corn ratio and the feed supply situation the same year and one year previous to the production period.

Shepherd (14) in 1942 concluded that changes in hog production closely followed changes in corn production. This relationship was estimated to be one to one. A reasonably close graphical relationship of one to one was considered feasible. When the preceding corn crop was averaged with the current crop in years of large fluctuations in the size of crop, a fairly close graphical fit was obtained. When this procedure was followed, the small crop was weighted two and the large crop was weighted one, irrespective of which came first. It was logical to adjust the corn production data to

provide allowance for the time required to increase hog production, as measured by hog slaughter, by altering breeding plans. It was believed that a reduction in production can be achieved quickly by selling breeding stock. On the other hand, however, an increase in production requires more time.

Furthermore, Shepherd made the observation that the level of the hog-corn ratio has an effect on changes in subsequent farrowings rather than in the absolute level of farrowings itself. In addition, he found an average of the October through February hog-corn ratio plus the United States corn supply the previous October 1 to be fairly highly correlated with the number of sows farrowed during the spring season. The hog-corn ratio during the spring months was found to be of little help in explaining the number of sows farrowed in the fall.

Hiemstra (8) in a study in 1957 isolated and quantified certain factors which are responsible for causing quarter-to-quarter variation in hog production. Next, he used these factors as a basis for developing statistical models to be used in forecasting hog production. Hiemstra reasoned that, if production can be accurately forecast, future prices can in turn be estimated more accurately than they have been in the past. This was the first known quarterly analysis and represents a refinement of previous outlook techniques.

Previous studies have been made estimating sow farrowings on a six month basis. In Hiemstra's study, he had the first quarter of the year begin with the previous December and extend through February. The second quarter includes the sows farrowed during March, April, and May. These two quarters cover the conventional spring pig crop-reporting period. The third quarter is June through August and the fourth quarter covers the remaining months of September, October, and November.

A more recent study by Futrell (6) in 1957 estimated weekly supplies in advance, with the starting point being the past week's actual receipts. This figure was adjusted in the same proportion as the season index changed from that week to the next. A simple regression analysis was made using preliminary estimates of weekly marketings for a two-year period, and finding the relationship between these and the actual marketings. From this, a single variable-estimating equation was developed from which final estimates of weekly supplies were made. The weekly advance estimates of hog supplies were then used as a base for estimating daily supplies. The average proportion of the week's total hog supply that was sold on each day, based on a recent four-year period, was used to break the weekly estimates into advance daily estimates of hog supplies. It was concluded that the results obtained in estimating weekly marketings were precise enough

to be of definite value to producers and other segments of the trade.

Price and sales forecasting equations

Darcovich and Heady (3) developed and tested 14 expectation models for improving the efficiency of forecasting prices, and livestock and crop supplies. Their models were those known to be used by farmers or those that sound logic indicated farmers would use. The criterion of efficiency was the size of the forecast error.

Baker (1) and Heer (7) have made evaluation studies on the accuracy of general economic forecasting. These studies are relevant insofar as they tested the accuracy of forecasts. Baker evaluated the accuracy of the federal government's economic forecasts related to agriculture. In a similar study, Heer applied a measure to indicate the accuracy of directional farm price predictions published in the Iowa Farm Science Outlook Letter during a specified three-year period. An accuracy score, ranging from 0 to 100, was employed in both studies with 50 being the score that would be obtained if random forecasts were made over a long period.

Baker's evaluation of the accuracy of federal agricultural economic forecasts, disclosed that federal government forecasts dealing with specific prices received by farmers had an accuracy score of 60.

Heer's evaluation showed a score of 74.6 for the accuracy of farm price predictions. It would thus appear that predictions of prices received by farmers that were published in the Iowa Farm Science Outlook Letter during the three-year period were more accurate than similar predictions published by the federal government over a 28-year period.

Francis (5) developed a study on the methods of forecasting hog sales on a quarter-year basis. The principal factors that affected hog sales (y_1) during month (t) included x_1, the number of births at t-6; x_2, the number of births at t-7; x_3, the number of births at t-8; and x_5, the number of sows farrowed at t-3 plus the number of sows farrowed at t-4.

It is somewhat difficult, according to the conclusions of Francis, for any mathematical expression, regardless of how complex, to fully sum up the diverse transactions in the marketing of hogs, inasmuch as the decision of any one farmer at a particular time is dependent on a variety of factors.

Maki (10) in 1959 released the most recent study on alternative methods of forecasting changes in beef and pork prices which were derived from quarterly data covering the 32-quarter period, 1949 through 1956. The alternative forecasting equations were used to obtain several sets of predicted prices for each of the three major market levels--primary, wholesale, and retail.

Two different models of market relationship were used in the study. First, the dressed or wholesale meat market was considered as the critical pricing level at which prices were adjusted to predetermined levels of beef and pork quantities and to consumer incomes and tastes. The other model of market relationship involved the national retail market as the critical pricing level. Price reaction coefficients were derived with reference to the wholesale market level. The average quarterly wholesale prices were first estimated by using one of the wholesale price equations. Following this, the retail and live prices were related to both the reported and the estimated wholesale price. Specifically the statistical method of least squares was used to estimate the three sets of market relationships--the primary, the wholesale, and the retail levels.

A forthcoming report by Maki and Liu (11) shows the effects of year-to-year and quarterly market variabilities on efficiency in the meat industry in terms of a series of prediction equations depicting the internal mechanism of the cattle and hog cycles. The specific objectives of their report were: (1) to describe the interdependencies in the livestock-meat economy, including the effects of the short-term price variations on marketing and slaughter of livestock and on consumption of meat products, (2) to develop an adequate forecasting procedure for ascertaining short-term

changes in certain critical variables in the livestock-meat economy, and (3) to ascertain the nature and extent of livestock plant and facility requirements in the livestock-meat economy under different patterns of short-term instabilities in livestock prices, marketings, and slaughter.

Theory and assumptions

When the supply and demand for a commodity is being estimated, it is necessary to decide whether to use a single-equation or a simultaneous equation model. According to Fox (4), a single equation is appropriate when a negative answer can be given each of five questions as follows:

1) Is the supply of the given commodity affected by the current price?
2) Is consumption of a given commodity significantly affected by current price or by the demand for export or storage?[1]
3) Is consumer income significantly affected by changes in price or consumption of the given commodity?
4) Is the supply of any competing commodity affected by the current price of the given commodity?
5) Is more than one major domestic outlet available

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[1]Consumption of pork is significantly affected by current price. An affirmative answer to this question does not affect the decision to use a recursive equation.

for the given commodity? (Is it necessary to determine whether the supply is "predetermined," i.e., if its current value is not affected by current value of other varieties in the same structure? Predetermined variables may be used as independent variables in a least-squares analysis.)

The dependent variable for supply falls readily into the classification of a predetermined variable. The supply is measured in terms of receipts for this problem involving short-term variability. Minor short-term variations in the supply of pork are made by varying market weights. The variations, however, are not large enough to justify using an additional equation. Questions two and three are related to demand analysis. The application of these questions to consumption of pork at the time of marketing requires a negative answer.

Competing commodities, beef, lamb, or poultry, are affected by the current price of hogs, a production lag, however, is required for both pork and beef and, therefore, question four can be answered negatively for defining the dependent variable as being predetermined.

In the single-equation least-squares model, the dependent variable may be explained or "caused" by the action of the independent variables. All the principal independent

variables known to affect the dependent variable are included when a regression equation is set up. Each regression coefficient measures the effect of that particular independent variable on the dependent variable, assuming all other variables in the regression are held constant. The coefficient of determination measures the extent to which the combined independent variables have explained the dependent variable.

The only important assumption in a least-squares regression is that the disturbance factors should be uncorrelated with the independent variables, according to Wold and Jureen (18, p. 56). They point out that the major objectives of regression analysis are to obtain forecasts and to establish several casual relations. Both objectives are fundamental to this study.

The analysis of time-series data may involve biases due to multicollinearity. Independent variables may be subject to two or more relations. In addition to the relation of the independent variables with the dependent variable, the independent variable may be correlated with some outside variable. This outside variable may in turn be correlated with the dependent variables.

EMPIRICAL ANALYSIS

Testing of Models

Following the procedure outlined in the previous chapter, data covering the period 1959 to 1960 were employed in the testing of the economic models described earlier. A separate set of coefficients was derived on weekly data for each of the following years: 1955, 1956, 1957, 1958, and 1959. The derived relationships based on the 1959 data, the only year used, were then adjusted to provide a new set of empirical coefficients for predicting weekly prices and marketings during 1960.

United States demand relationships

The regression relationships (accounting for the explained variation in the dependent variable) were based on data covering the 5-year period, 1955-59.

According to the data in Table 4, a slightly higher percentage of the week-to-week changes for the price of the 200-220 pound weight class of barrows and gilts at Chicago was explained in 1955 ($R^2 = 0.691$) by the two variables--difference between weekly federally inspected slaughter and average quarterly slaughter at the weekly rate for hogs, $(Q'_{3wt} - \frac{Q'_{3t}}{k_t})$, and the difference between weekly federally inspected slaughter and k_t average quarterly slaughter at the weekly rate for cattle and calves,

$(Q'_{1,2wt} - \frac{Q'_{1,2t}}{k_t})$, than in later years.[1] However, the range of R^2 was about 15 per cent with 1959 having the smallest coefficient ($R^2 = 0.545$).

Table 4. Estimated effects on the difference between the weekly and quarterly live prices, in dollars per 100 pounds, of a 1-unit change in selected explanatory variables, slaughter hogs, 1955-59

Year	Effect on live price difference of a 1-unit change in: $(Q'_{3wt} - \frac{Q'_{3t}}{k_t})$	Effect on live price difference of a 1-unit change in: $(Q'_{1,2wt} - \frac{Q'_{1,2t}}{k_t})$	Constant term 1	R^2
1955	-0.0089** (0.0009)	0.0227** (0.0036)	0.0092	0.691
1956	-0.0056** (0.0007)	0.0032 (0.0031)	0.0065	0.597
1957	-0.0074** (0.0010)	0.0021 (0.0033)	-0.0022	0.562
1958	-0.0123** (0.0012)	0.0178** (0.0042)	0.0046	0.676
1959	-0.0056** (0.0007)	0.0182** (0.0031)	0.0435	0.545

**Significantly different from zero at the 0.01 probability level.

[1] Following customary practice, the standard error of the regression coefficient is shown in parentheses directly below the regression coefficient.

United States supply relationships

The prediction equation was quite satisfactory in explaining week-to-week changes in federally inspected slaughter, as suggested by the R^2's and standard error values shown in Table 5. In 1956, for example, the two variables--lagged weekly slaughter hogs, $Q'_{3(w-1)t}$, and difference between lagged average weekly price and average quarterly price, $(P'_{3(w-1)t} - P'_{3t})$--explained 89.3 per cent of the variation in the dependent variable, Q'_{wt}, during the 52-week period.

Table 5. Estimated effects on the supply of federally inspected slaughter hogs, in 1,000 head, of a 1-unit change in selected explanatory variables, 1955-59

Year	Effect on federally inspected slaughter hogs of a 1-unit change in: $Q'_{3(w-1)t}$	Effect on federally inspected slaughter hogs of a 1-unit change in: $(P'_{3(w-1)t} - P'_{3t})$	Constant term 1	R^2
1955	0.9965** (0.0330)	13.6232 (7.2605)	6.8530	0.951
1956	0.9037** (0.0515)	-24.3748 (14.4919)	114.8261	0.893
1957	0.9186** (0.0545)	-8.9004 (10.6080	93.6902	0.878
1958	0.8991** (0.0595)	-7.3835 (7.2656)	114.6916	0.854
1959	0.9372** (0.0541)	22.4930 (13.9014)	82.2479	0.865

**Significantly different from zero at the 0.01 probability level.

For the lagged weekly slaughter hogs in 1959, a 1-unit change was associated with a 0.9372-unit change in the dependent variable. Since the standard error of the regression coefficient was 0.0541 units, the calculated value of "t" was substantially in excess of the value of $t_{.01}$, thus denoting a regression coefficient significantly different from zero at the 0.01 probability level.

Regional demand relationships

The regression relationships (accounting for the explained variation of live price) were based on data covering the 5-year period, 1955-59.

According to the empirical results shown in Table 6, the two variables, average weekly price, Chicago, 200-220 pound weight class, and change in federally inspected slaughter from the previous week, were associated with the live price of slaughter hogs for each of the three weight classes at Chicago and the four weight classes at Sioux City and the Interior markets during the five-year period, 1955-59. The range of association (R^2) was from 0.93 to 0.99 during 1957 and 1959 for these same variables. The lowest R^2 during 1957 occurred for the 180-200 pound weight class of hogs sold at the Interior markets. During 1959, however, these same independent variables were highly associated (R^2 = 0.99) with the live price of the 240-270 pound weight class on the Sioux City

Table 6. Estimated effect on price variables, in dollars per 100 pounds, of a 1-unit change in selected explanatory variables of hogs, for specified weight classes, Chicago, Sioux City, and Interior markets, 1955-59

Dependent variable	Year	Effect on price variable of a 1-unit change in: $P'^{1,2}_{3wt}$	Effect on price variable of a 1-unit change in: $(Q'_{3wt} - Q'_{3wt-1})$	Constant term 1	R^2	S_y
$P'^{1,1}_{3wt}$	1955	0.9833** (0.0075)	-0.99** (0.29)	0.2548	0.997	0.1295
	1956	0.9540** (0.0081)	-0.45* (0.20)	0.5462	0.997	0.1023
	1957	0.9189** (0.1366)	-0.94* (0.39)	1.2183	0.989	0.1434
	1958	0.9395** (0.0118)	0.74 (0.39)	1.0665	0.992	0.1435
	1959	0.9992** (0.0106)	0.08 (0.32)	-0.2463	0.995	0.1198
$P'^{1,3}_{3wt}$	1955	1.0068** (0.0073	1.04** (0.29)	-0.2555	0.997	0.1269
	1956	1.0152** (0.0061)	0.29 (0.15)	-0.2779	0.998	0.0773
	1957	1.0187** (0.0100)	0.87** (0.28)	-0.4060	0.995	0.1049
	1958	1.0228** (0.0089)	0.69* (0.30)	-0.5891	0.996	0.1086
	1959	0.9815** (0.0117)	0.75* (0.32)	0.1423	0.993	0.1426

*Significantly different from zero at the 0.05 level of probability.

**Significantly different from zero at the 0.01 level of probability.

Table 6. (Continued)

Dependent variable	Year	Effect on price variable of a 1-unit change in: $P'^{1,2}_{3wt}$	Effect on price variable of a 1-unit change in: $(Q'_{3wt} - Q'_{3wt-1})$	Constant term 1	R^2	S_y
$P'^{1,4}_{3wt}$	1955	0.9939** (0.0238)	3.58** (0.94)	-0.5441	0.973	0.4127
	1956	1.0685** (0.0197)	1.00* (0.48)	-1.4133	0.984	0.2490
	1957	1.0253** (0.0282)	2.50** (0.80)	-0.8574	0.965	0.2964
	1958	1.0400** (0.0202)	2.49** (0.80)	-1.3537	0.969	0.3204
	1959	--	--	--	--	--
$P'^{2,1}_{3wt}$	1955	--	--	--	--	--
	1956	0.8621** (0.0166)	-1.39** (0.40)	1.5905	0.983	0.2101
	1957	1.001** (0.022)	-0.97** (0.61)	-0.4301	0.978	0.2261
	1958	1.062** (0.0225)	0.75 (0.75)	-1.6873	0.978	0.2737
	1959	1.021** (0.0183)	0.42 (0.48)	-0.7080	0.986	0.2083
$P'^{2,2}_{3wt}$	1955	1.0470** (0.0191)	2.02* (0.76)	-1.0757	0.984	0.3315
	1956	0.9451** (0.0218)	-0.68 (0.53)	0.7275	0.975	0.2754
	1957	1.0779* (0.0261)	-0.28 (0.73)	-1.6118	0.972	0.2744

Table 6. (Continued)

Dependent variable	Year	Effect on price variable of a 1-unit change in: $P'^{1,2}_{3wt}$	Effect on price variable of a 1-unit change in: $(Q'_{3wt} - Q'_{3wt-1})$	Constant term 1	R^2	S_y
$P'^{2,2}_{3wt}$	1958	1.0770** (0.0229)	1.40 (0.77)	-1.8345	0.978	0.2785
	1959	0.9532** (0.0225)	1.01 (0.80)	0.5294	0.974	0.2747
$P'^{2,3}_{3wt}$	1955	1.0406** (0.0202)	2.47** (0.80)	-1.0564	0.0982	0.3493
	1956	0.9491** (0.0230)	-0.57 (0.56)	0.6301	0.973	0.2900
	1957	1.0674** (0.0266	0.22 (0.76)	-1.4592	0.971	0.2791
	1958	1.0809** (0.0202	1.92* (0.80)	-1.9904	0.977	0.2905
	1959	0.9363** (0.0248)	1.06 (0.69)	0.7536	0.967	0.3027
$P'^{2,4}_{3wt}$	1955	0.9916** (0.0273	3.68 (1.12)	-0.7806	0.969	0.4551
	1956	0.9977** (0.0253)	-0.32 (0.61)	-0.4273	0.970	0.3198
	1957	1.0345** (0.0314)	1.70 (0.89)	-1.1816	0.957	0.3297
	1958	1.0704** (0.0317)	3.33** (1.06)	-2.1685	0.959	0.3856
	1959	0.8626** (0.0323)	1.77 (0.89)	1.5615	0.937	0.3936

Table 6. (Continued)

Dependent variable	Year	Effect on price variable of a 1-unit change in: $P'^{1,2}_{3wt}$	Effect on price variable of a 1-unit change in: $(Q'_{3wt} - Q'_{3wt-1})$	Constant term 1	R^2	S_y
$P'^{3,1}_{3wt}$	1955	1.0308** (0.0152)	0.56 (0.60)	-1.5666	0.990	0.2627
	1956	0.9216** (0.0182)	-1.64** (0.44)	0.1169	0.982	0.2300
	1957	0.9881** (0.0380)	-0.42 (0.88)	-1.1083	0.933	0.3988
	1958	1.0290** (0.0263)	-0.75 (0.88)	-2.1599	0.969	0.3192
	1959	0.9477** (0.0131)	0.87* (0.36)	-0.5040	0.991	0.1593
$P'^{3,2}_{3wt}$	1955	1.0155** (0.0166)	1.78** (0.65)	-0.9279	0.987	0.2872
	1956	0.9472** (0.0188)	-0.88 (0.46)	0.2400	0.982	0.2373
	1957	1.0165** (0.0234)	0.39 (0.65)	-1.0582	0.975	0.2457
	1958	1.0165** (0.0181)	0.43 (0.60)	-1.1769	0.985	0.2194
	1959	0.9304** (0.0153)	1.27** (0.42)	0.3102	0.987	0.1866
$P'^{3,3}_{3wt}$	1955	1.0136** (0.0205)	2.46** (0.81)	-1.1440	0.980	0.3535
	1956	0.9986** (0.0188)	-0.32 (0.46)	-0.7457	0.983	0.2373

Table 6. (Continued)

Dependent variable	Year	Effect on price variable of a 1-unit change in: $P'^{1,2}_{3wt}$	Effect on price variable of a 1-unit change in: $(Q'_{3wt} - Q'_{3wt-1})$	Constant term 1	R^2	S_y
$P'^{3,3}_{3wt}$	1957	1.0160** (0.0243)	0.86 (0.69)	-1.2292	0.973	0.2549
	1958	1.0173** (0.0177)	0.92 (0.59)	-1.4544	0.985	0.2151
	1959	0.9047** (0.0154)	1.17** (0.43)	0.4691	0.986	0.1876
$P'^{3,4}_{3wt}$	1955	1.0017** (0.0238)	3.17** (0.94)	-1.4658	0.973	0.4130
	1956	1.0198** (0.0202)	-0.01 (0.41)	-1.4735	0.981	0.2552
	1957	0.9887** (0.0273)	1.67* (0.77)	-1.1144	0.964	0.2867
	1958	1.0110** (0.0210	1.81* (0.70)	-1.7883	0.979	0.2550
	1959	0.8776 (0.0202)	0.89 (0.56)	0.4393	0.975	0.2468

market. The association (R^2) between the live price and the independent variable at Chicago, Sioux City and the Interior markets ranged from 0.97 to 0.99 during 1956. As illustrated for the data in Table 6, if the average weekly price of hogs at Chicago were forecast with a high degree of precision (see Table 4), then a corresponding degree of precision can be

expected in the forecasts of the hog prices listed in Table 6. Unfortunately, the estimates based on the aggregate demand model are much less satisfactory than the estimates based on the regional demand model. Further work is needed in improving the aggregate demand model to enhance its usefulness for short-term forecasting.

Regional supply relationships

The regression relationships (accounting for the explained variation of the dependent variable) were based on data covering the 5-year period, 1955-59.

The empirical results, shown in Table 7, disclose that federally inspected slaughter and change from one quarter to the next were highly associated with the total weekly hog receipts for the 12 markets during 1955, 1956, and 1957. The range of the R^2 for these variables during the three years was 0.887 to 0.922. However, for the years 1958 and 1959 the R^2's were 0.829 and 0.837, respectively.

The empirical results for the additional supply equation shown in Table 7 disclose that the three independent variables, federally inspected slaughter, quarterly dummy variable (T = 1,2,3,4), and difference in price of the 200-220 pound weight class at Interior markets, last week over preceding week, were highly associated with total weekly hog receipts for the Interior markets. The R^2's ranged from 0.900 to

Table 7. Estimated effects on hog receipts at 12 markets and Interior markets, in 1,000 head, of a 1-unit change in selected explanatory variables, hogs, 1955-59

Dependent variable	Year	Effect on hog receipts for 12 markets and Interior markets of a 1-unit change in: Q'_{3wt}	T	$(P'^{3,2}_{3(w-1)t} \div P'^{3,2}_{3(w-2)t})$	Constant term 1	R^2	S_y
Q'^{4}_{3wt}	1955	0.3026** (0.0141)	1184.4687 (3452.0335)		-12,875	0.923	25
	1956	0.2460** (0.0120)	-9784.6763** (2292.0064)		65,250	0.902	1,845
	1957	0.2168** (0.0111)	520.8793 (1436.8529)		54,896	0.888	11,530
	1958	0.2129** (0.0154)	2121.7283 (1761.8085)		51,729	0.830	13,185
	1959	0.2305** (0.0153)	-1042.1019 (2163.5318)		53,222	0.838	16,312
Q'^{3}_{3wt} [a]	1955	0.3438** (0.0064)	5.0506** (11.2577)	-29.7715	-56	0.988	11

[a] Q'^{3}_{3wt} and Q'_{3wt} are coded in 1,000's.

**Significantly different from zero at the 0.01 level of probability.

Table 7. (Continued)

Dependent variable	Year	Effect on hog receipts for 12 markets and Interior markets of a 1-unit change in: Q'_{3wt}	T	$(P'^{3,2}_{3(w-1)t} \div P'^{3,2}_{3(w-2)t})$	Constant term 1	R^2	S_y
Q'^{3}_{3wt} [a]	1956	0.346652** (0.009976)	4.5351** (1.9627)	-25.5082 (72.6897)	-85	0.962	15
	1957	0.3374** (0.0153)	9.1169** (1.8975)	-264.2435 (105.4117)	147	0.930	15
	1958	0.3069** (0.0104)	13.8080** (1.3554)	211.1564 (79.5843)	-283	0.967	9
	1959	0.3174** (0.0176)	3.4785 (2.4457)	-528.0176 (213.1013)	462	0.901	18

0.98 for the 5-year period, 1955-59. Thus, both the regional demand and the regional supply relationships yield quite satisfactory results as indicated by the percentage of total variation in the dependent variable that was explained by the so-called independent variables.

Predicting Weekly Prices and Marketings

United States price difference estimates, 1959 and 1960

The 1959 prediction equation in Table 4 was used to estimate the weekly price series for 1960. This equation was of the form,

$$\Delta\hat{X}_{1t} = a + b_1\Delta X_{2t} + b_2\Delta X_{3t}, \qquad (6)$$

where the coefficients a, b_1, and b_2 denote the values 0.0435, -0.0056, and 0.0182, respectively, as shown in Table 4.

The deviations of the estimated weekly hog price from the actual price difference, using the 1959 prediction equation, are shown in Figure 5 for both 1959 and 1960. For each year, the standard deviations of the errors of estimate were computed by the formula

$$S = \frac{\sum_{t=1}^{52} (\Delta X_{1t} - \Delta\hat{X}_{1t})^2}{N}, \qquad (7)$$

Table 8. Difference between weekly price, in cents per 100 pounds, for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class at Chicago; standard deviations of the errors of estimates, and average absolute deviations of the estimates, 1959 and 1960

Year	Average weekly and quarterly price differentials	Standard deviation of estimates	Average absolute deviation of the estimates
1959	43.46	33.90	24.27
1960	77.88	78.01	65.96

where

X_{1t} = the actual weekly price.

$\hat{X}_{1t}$ = the estimated weekly price.

N = 52 (when data were available for all weeks).

The average absolute deviation for the estimate is presented as an alternative measure of estimating precision. A summary of the results is presented in Table 8.

The method used for the interpretation of the graphs may be illustrated by Figure 7a as developed from the prediction equation of the aggregate model:

The deviations of the difference between the weekly price for the 200-220 pound barrows and gilts at Chicago and the average quarterly price for the same market class of hogs at Chicago showed several marked deviations from the actual price. The deviations during the first quarter of 1959, for example, may be explained by the comparison of forecasts made by the U.S.D.A. on breeding intentions as reported in December, 1958, with sows farrowed in the spring of 1959. The percentages by regions that the 1959 spring sows farrowed were of 1958 compared with the intentions as reported last December

were as follows: North Atlantic, 109 now and 105 per cent last December; East North Central, 108 and 108; West North Central, 110 and 112; South Atlantic, 115 and 111; South Central, 121 and 121; and West, 116 and 121 per cent. During the spring of 1960 farrowings were down 3 per cent from breeding intentions as reported in December, 1959, with all regions showing fewer farrowings than intended.

Additional explanations for the deviations may be explained by changes in the supply and demand conditions. The fall pig crop for 1958 was the largest since 1943. Federally inspected hog slaughter increased considerably and, as a result, slaughter hog prices showed a decline of $2.00 to $2.75 early in January at Chicago. This was the sharpest downturn in prices since September, 1946. Unexpected changes in federally inspected slaughter of cattle and calves are an additional factor affecting the accuracy of the price forecasts.

During 1959, the standard deviation of the errors of the estimate for the difference between the weekly price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class at Chicago was 34 cents. The average difference between the weekly and quarterly price, per week, was 43 cents and the average absolute deviation of the estimate from the actual price was 24 cents. A few weeks

Figure 7a. Deviations of the estimated difference between the weekly price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class of hogs at Chicago, 1959

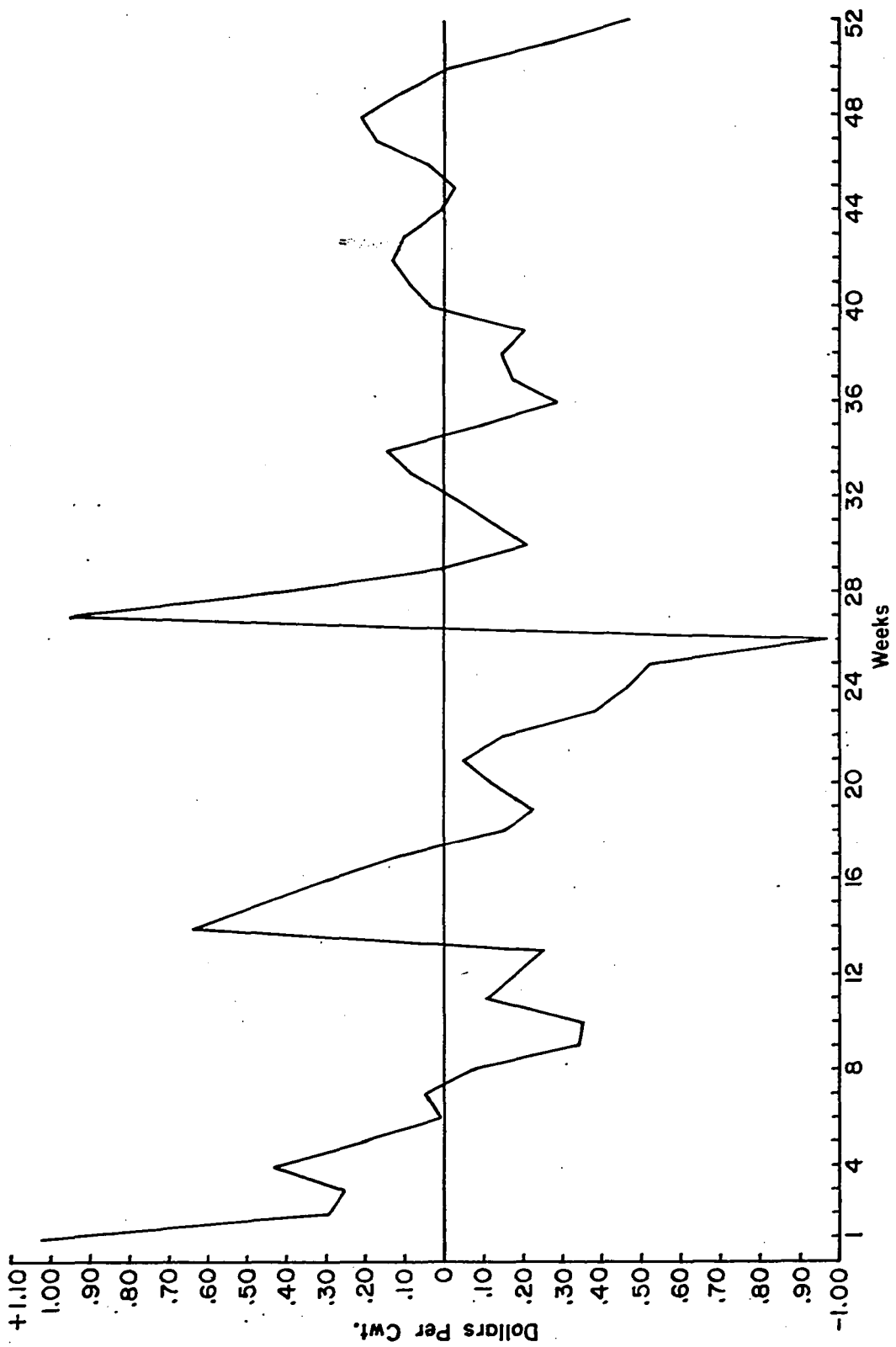

+1.10
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
.10
.20
.30
.40
.50
.60
.70
.80
.90
-1.00
Dollars Per Cwt.
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Figure 7b. Deviations of the estimated difference between the weekly price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class of hogs at Chicago, 1960

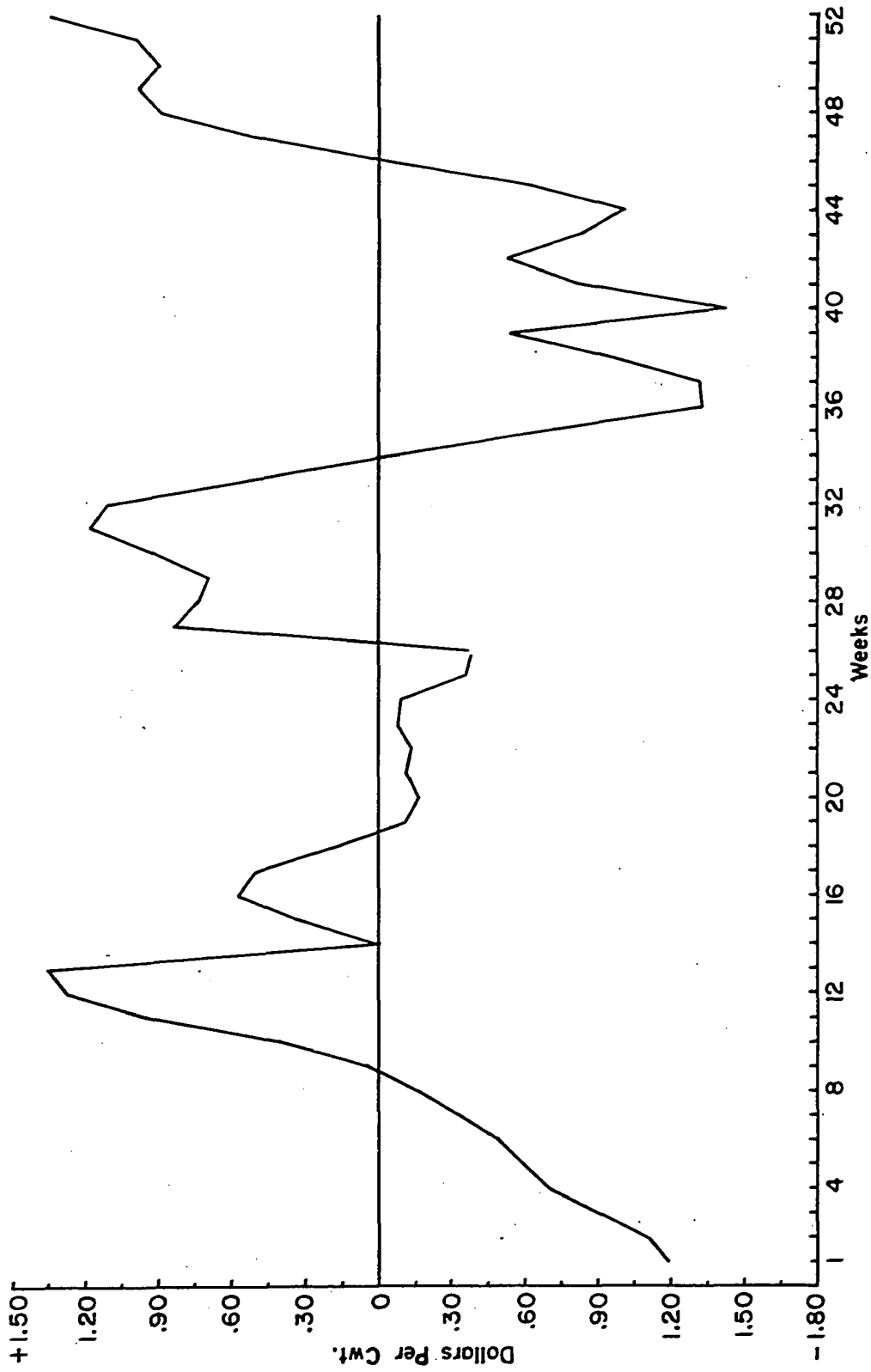

+1.50
1.20
.90
.60
.30
0
.30
.60
.90
1.20
1.50
-1.80
Dollars Per Cwt.
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Table 9. Frequency distribution of errors in estimating the difference between weekly price per 100 pounds for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class at Chicago, 1959

	Size of error in cents					
	0 to 20	21 to 40	41 to 60	61 to 80	81 to 100	over 100
Number	30	12	6	1	2	1
Per cent	57.7	23.1	11.5	1.9	3.9	1.9

in which the estimating error was exceptionally large accounted for a major part of the total error. For example, five weeks in which the estimating error was greater than 50 cents price difference accounted for 60 per cent of the total sum of squares of deviations. Over half of the estimating errors were less than 20 cents (Table 9).

The 1960 estimates were computed through the same procedure used for making the 1959 estimates and for checking the estimating precision. During 1960 the standard deviation of the errors of estimate for the difference between the weekly price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class at Chicago was 78 cents or 44 cents more per hundred weight over the preceding year. The average difference between the quarterly and weekly price, per week, was 78 cents and the average absolute deviation of the estimate from the actual

Table 10. Frequency distribution of errors in estimating the difference between weekly price per 100 pounds for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class of hogs at Chicago, 1960

	Size of error in cents					
	0 to 20	21 to 40	41 to 60	61 to 80	81 to 100	over 100
Number	12	5	8	5	11	11
Per cent	23.0	9.6	15.4	9.6	21.2	21.2

price difference was 66 cents. Eleven weeks in which the estimating error was greater than $1.00 price difference accounted for 54 per cent of the total sum of squares of deviations. The estimating errors were greater for the 1960 estimates. During 1959, about 58 per cent of the estimating errors were less than 20 cents, whereas, for 1960, 42 per cent of the estimating errors were over 80 cents (Table 10).

United States federally inspected slaughter estimates, 1959 and 1960

A multiple regression equation was computed for the 1959 data to determine the relationship between the estimates, $\hat{X}_4$, and the actual receipts, X_4, of federally inspected slaughter during 1959 and 1960. The algebraic equation was of the form,

$$X_{4t} = a_2 + b_{21}X_{5t} + b_{22}X_{6t}, \qquad (8)$$

Table 11. Weekly federally inspected slaughter hogs; standard deviation of the errors of estimates, and average absolute deviations of the estimates, 1959 and 1960

Year	Average weekly receipts federally inspected slaughter	Standard deviation of estimates	Average absolute deviation of the estimates
1959	1,312,170	57,900	39,920
1960	1,271,730	64,830	43,280

while the corresponding prediction equation was

$$\hat{X}_{4t} = 82.2479 + 0.9372X_{5t} + 22.4930X_{6t}, \qquad (9)$$

with a R^2 of 0.865. Substitution into this equation was done to compute the estimated receipts of federally inspected slaughter for 1959 and 1960.

The deviations of the estimated weekly federally inspected slaughter hogs from the actual slaughter are shown for 1959 and 1960 in Figures 8 and 9. Furthermore, the standard deviations of the errors of estimate and the average absolute deviations were computed for 1959 and 1960. These data are summarized in Table 11.

The standard deviations of the error of estimate during 1959 for weekly federally inspected slaughter were 57,890 head. The average weekly receipts of federally inspected

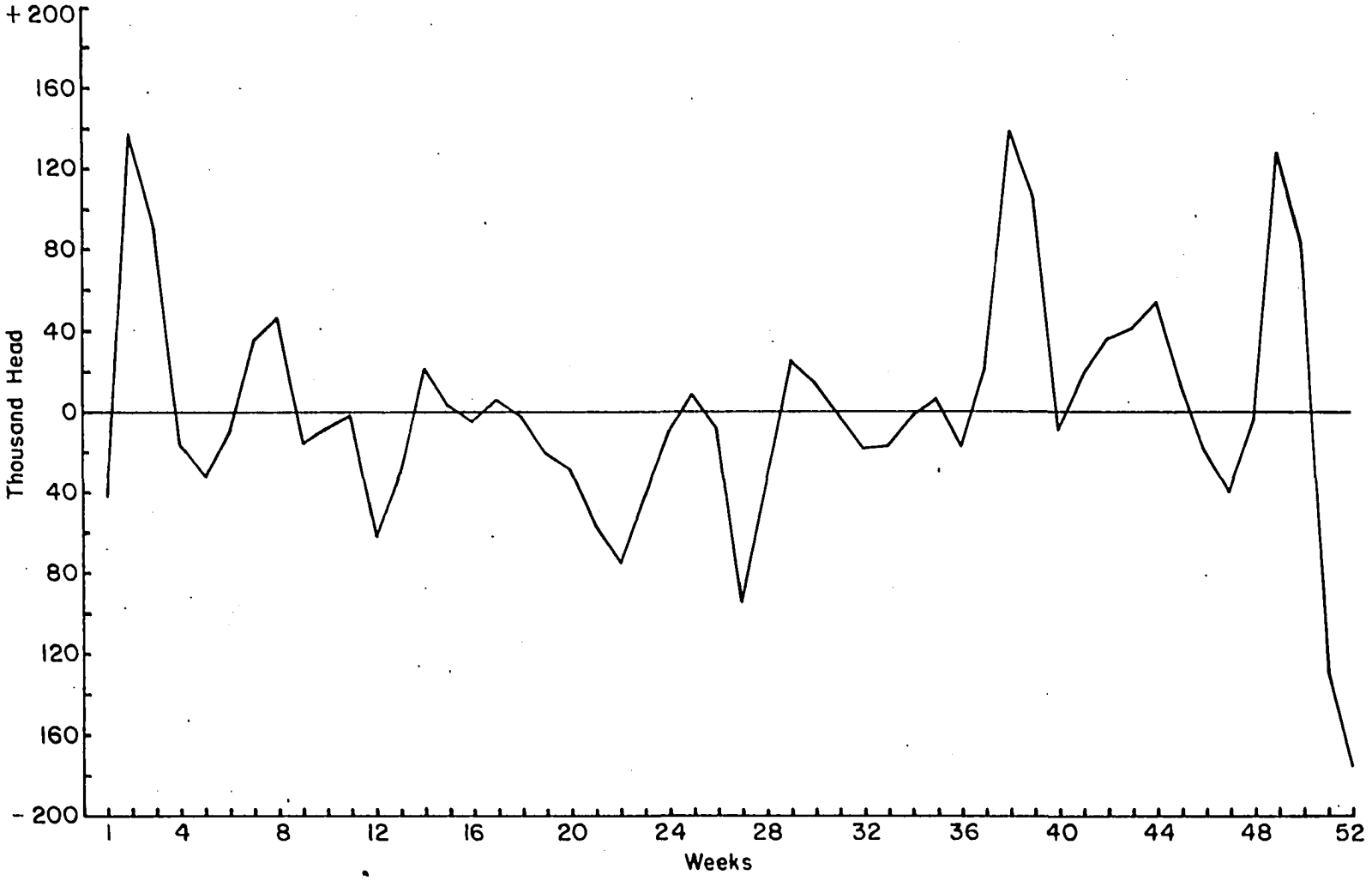


Figure 8. Deviations of the estimated weekly federally inspected slaughter hogs from the actual slaughter, U. S., 1959

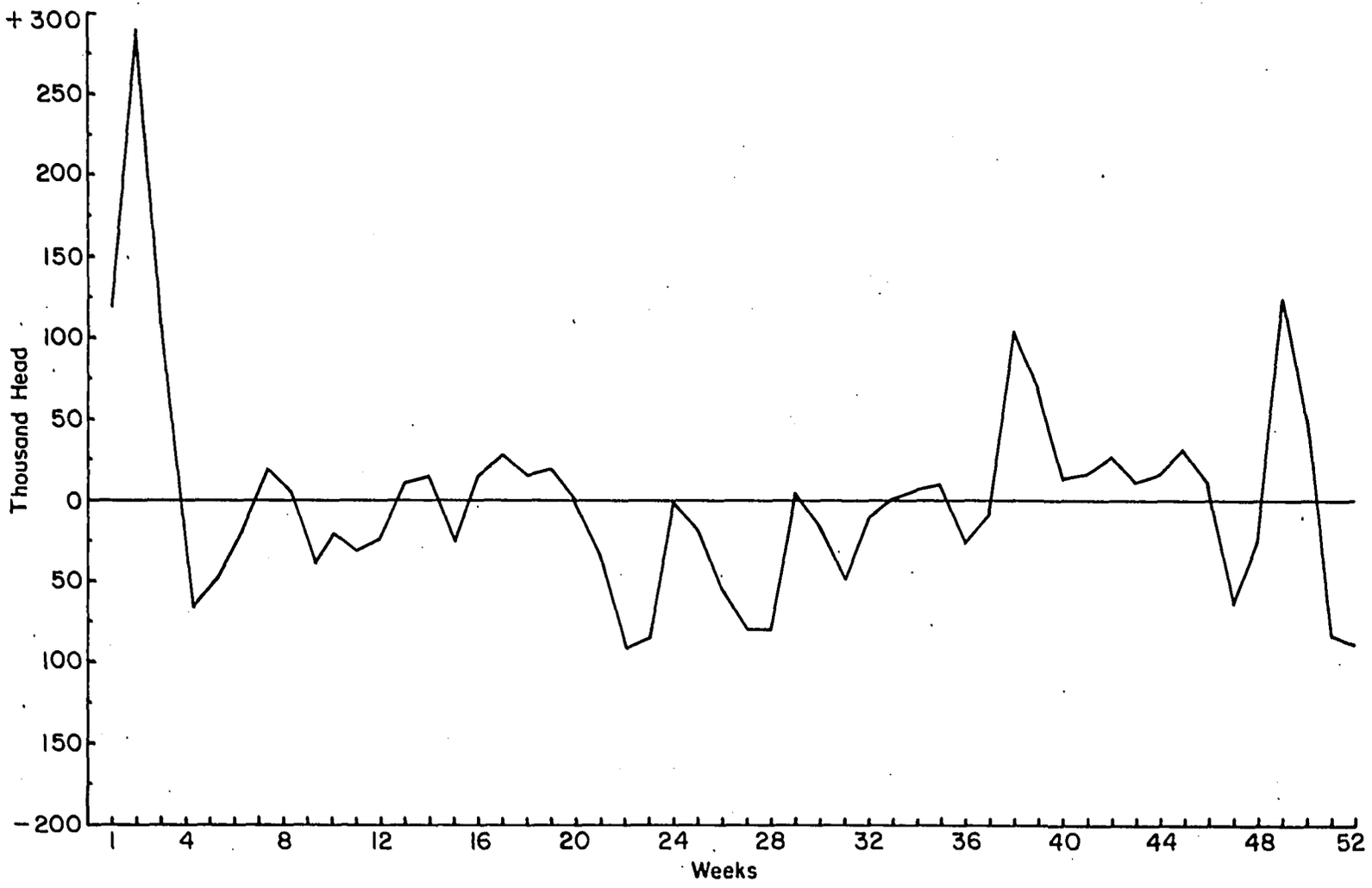


Figure 9. Deviations of the estimated weekly federally inspected slaughter hogs from the actual slaughter, U. S., 1960

Table 12. Frequency distribution of errors in estimating the weekly federally inspected slaughter, U. S., 1959

Size of error in number of head	Number	Per cent
0 to 10,000	14	26.9
10,001 to 20,000	9	17.3
20,001 to 30,000	7	13.5
30,001 to 40,000	4	7.7
40,001 to 50,000	5	9.6
Over 50,000	13	25.0

slaughter were 1,312,170 head. The average absolute deviation of the estimates from the actual receipts was 39,920 head. Six weeks in which the estimating error was greater than 100,000 head of federally inspected slaughter accounted for 65 per cent of the total sum of squares of deviation. Slightly over 44 per cent of the estimating errors were less than 20,000 head (Table 12).

In 1960 the standard deviations of the error of estimates were 6,930 head more than those for 1959. The average weekly receipts of federally inspected slaughter were 40,440 head more during 1959 than during 1960. The average of the absolute deviations of the estimate from the actual receipts was 43,280 head. Five weeks in which the estimating error was greater than 100,000 head of federally inspected

Table 13. Frequency distribution of errors in estimating weekly federally inspected slaughter, U. S., 1960

Size of error in number of head	Number	Per cent
0 to 10,000	9	17.3
10,001 to 20,000	14	26.9
20,001 to 30,000	7	13.5
30,001 to 40,000	3	5.8
40,000 to 50,000	2	3.8
Over 50,000	17	32.7

slaughter accounted for 62 per cent of the total sum of squares of deviations. The estimating errors were slightly more accurate for 1960. Slightly over 44 per cent of the estimating errors were less than 20,000 head (compared with 44 per cent of the estimating errors for 1959 with less than 20,000 head), as shown in Table 13.

Regional weekly price estimates, 1959

The relationships between the estimate price, $\hat{X}_i$ ($i = 1....11$), and the actual price, X_i ($i = 1....11$), were determined by multiple regression for the year 1959. The regression equation was of the form,

$$X_i = a + b_{11}X_{12} + b_{12}X_{13}. \qquad (10)$$

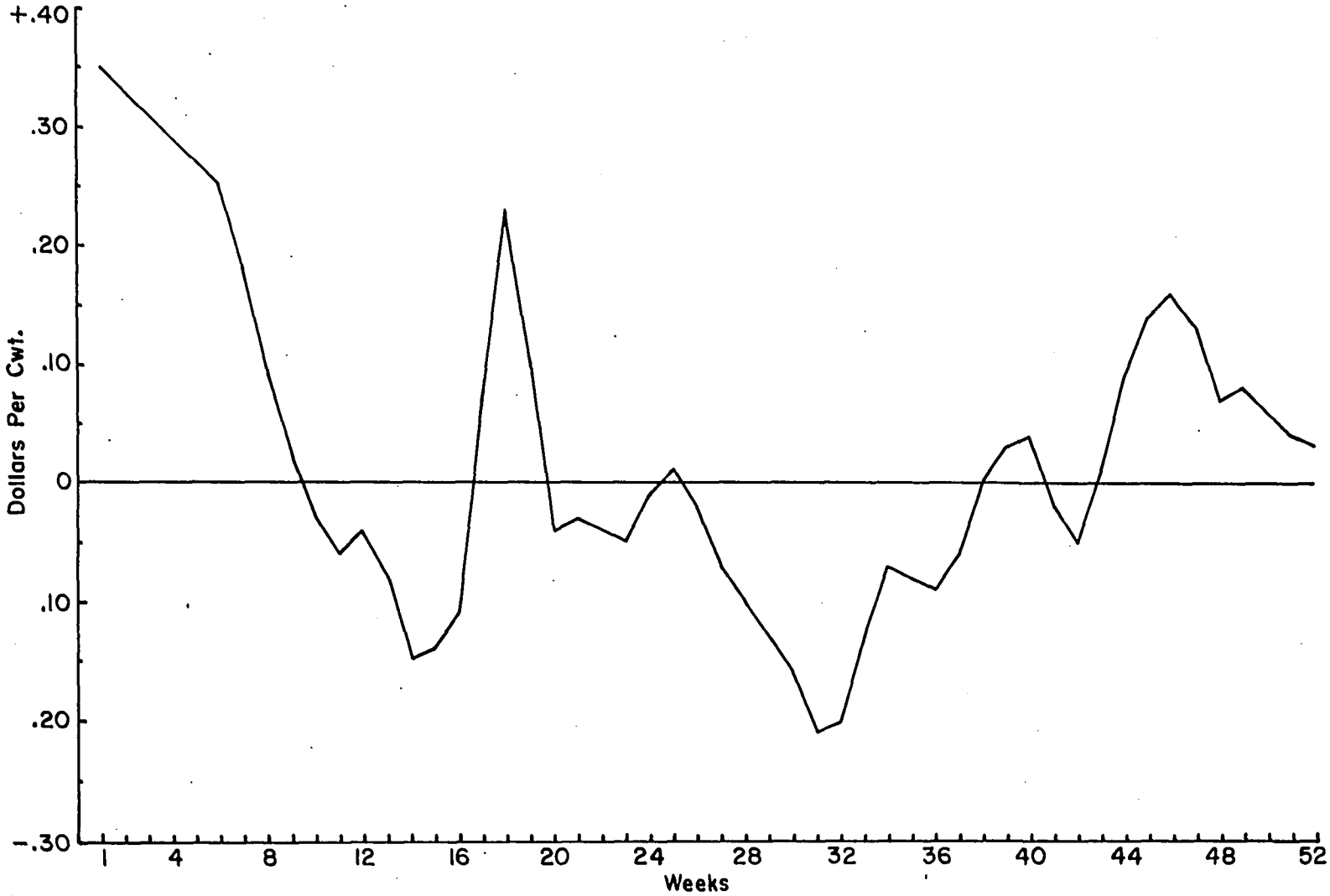


Figure 10. Deviations of the estimated price from the actual price for the 180-200 pound weight class of slaughter hogs at Chicago, 1959

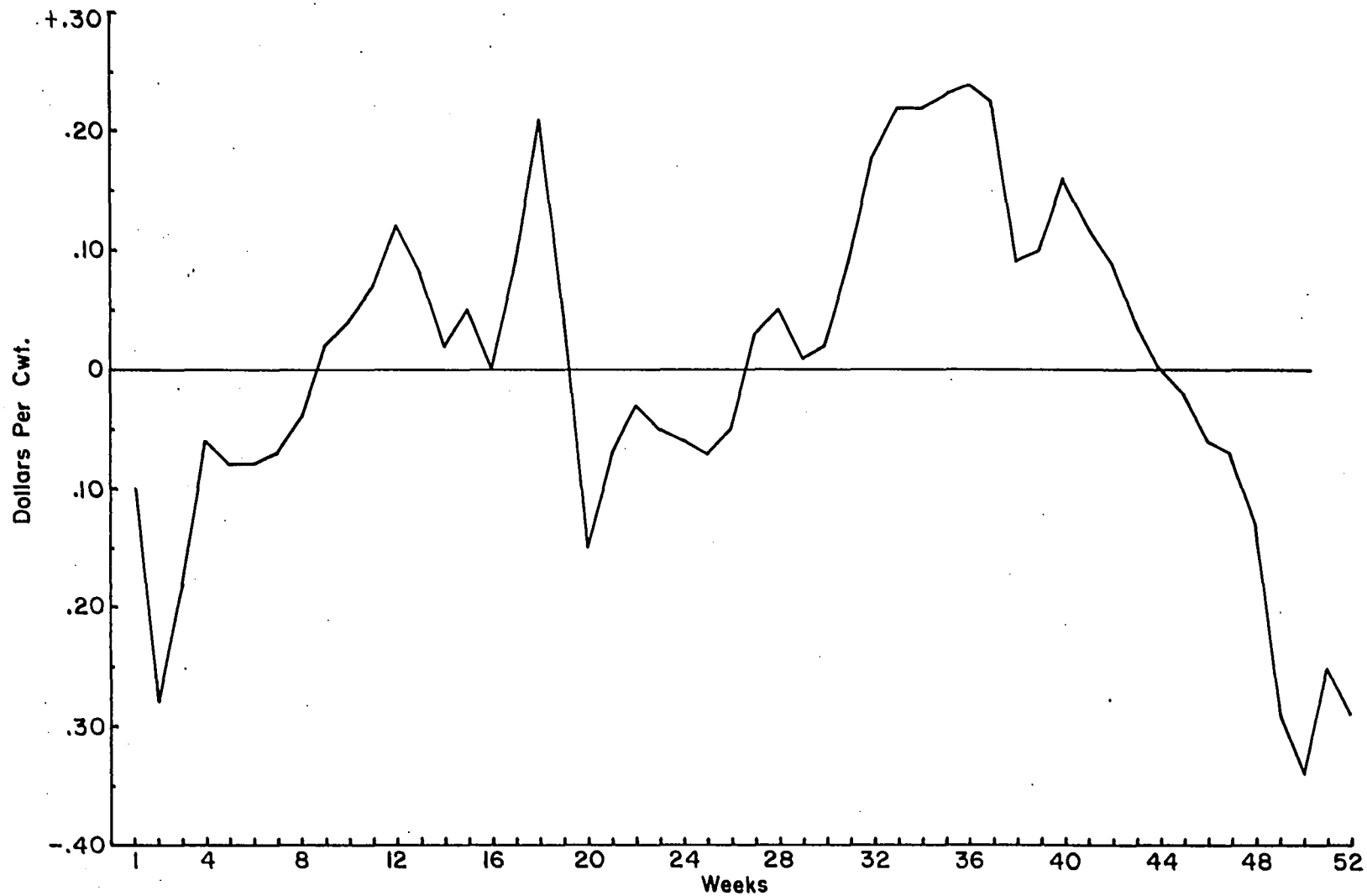


Figure 11. Deviations of the estimated price from the actual price for the 220-240 pound weight class of slaughter hogs at Chicago, 1959

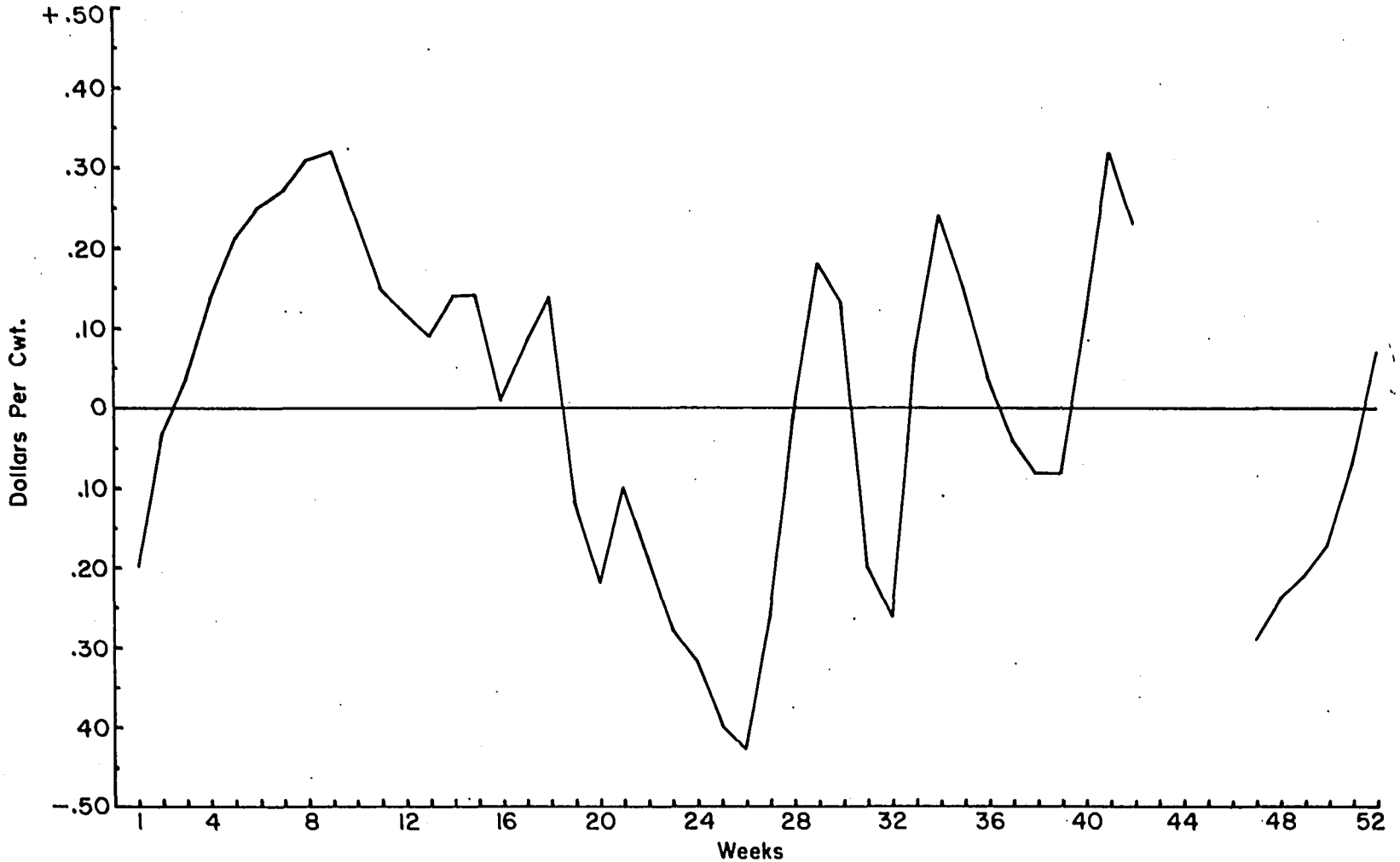


Figure 12. Deviations of the estimated price from the actual price for the 180-200 pound weight class of slaughter hogs at Sioux City, 1959

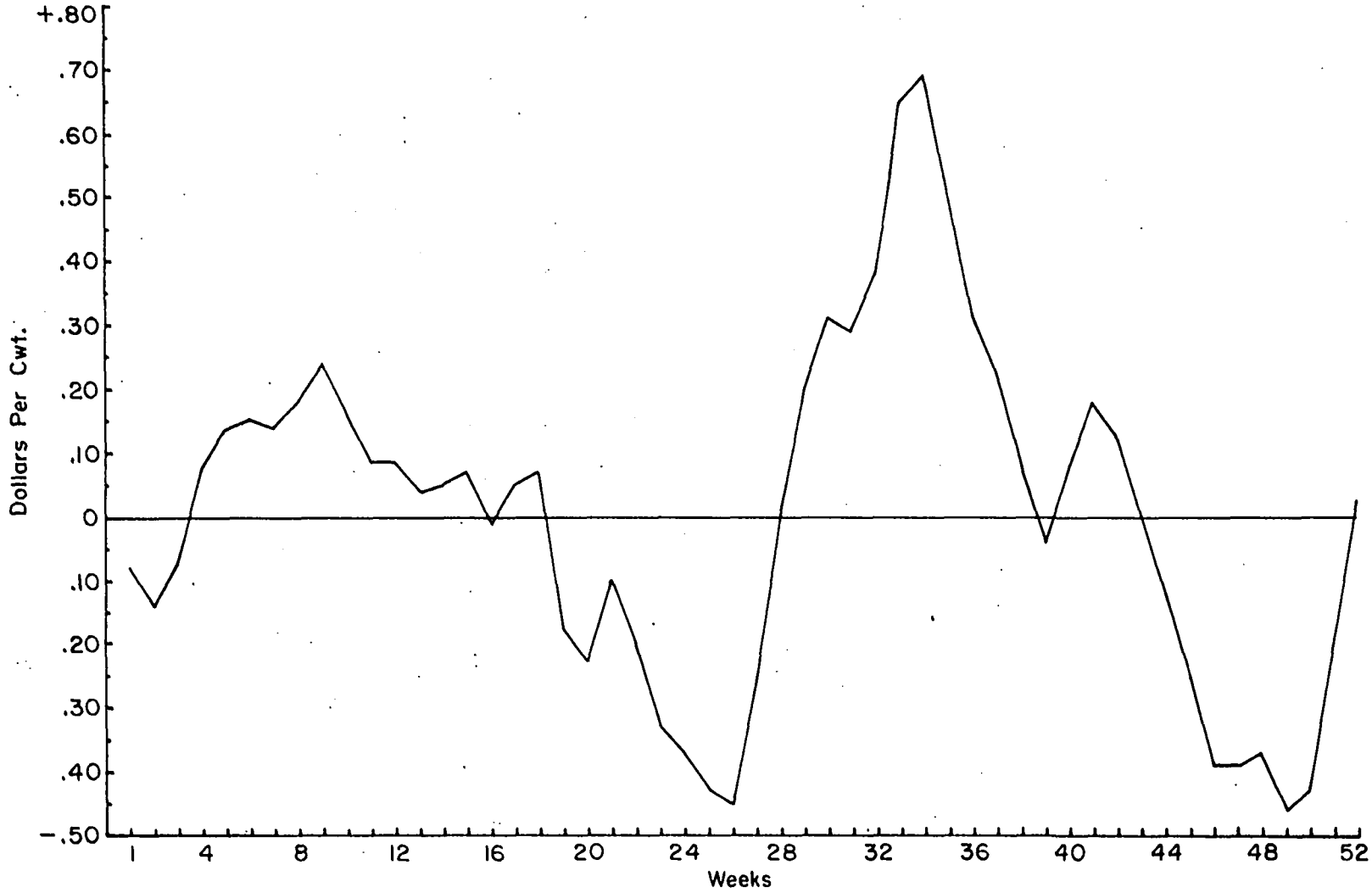


Figure 13. Deviations of the estimated price from the actual price for the 200-220 pound weight class of slaughter hogs at Sioux City, 1959

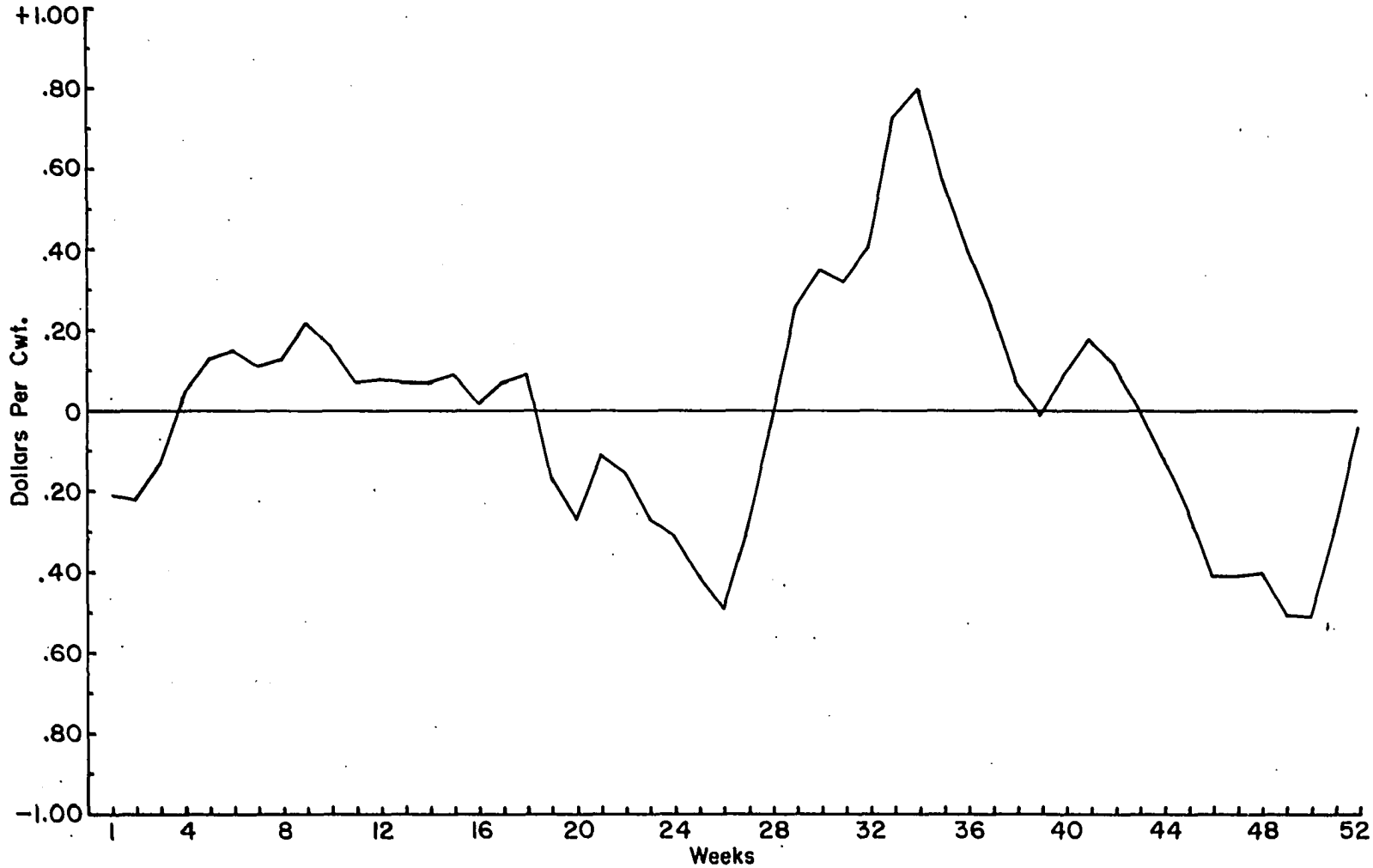


Figure 14. Deviations of the estimated price from the actual price for the 220-240 pound weight class of slaughter hogs at Sioux City, 1959

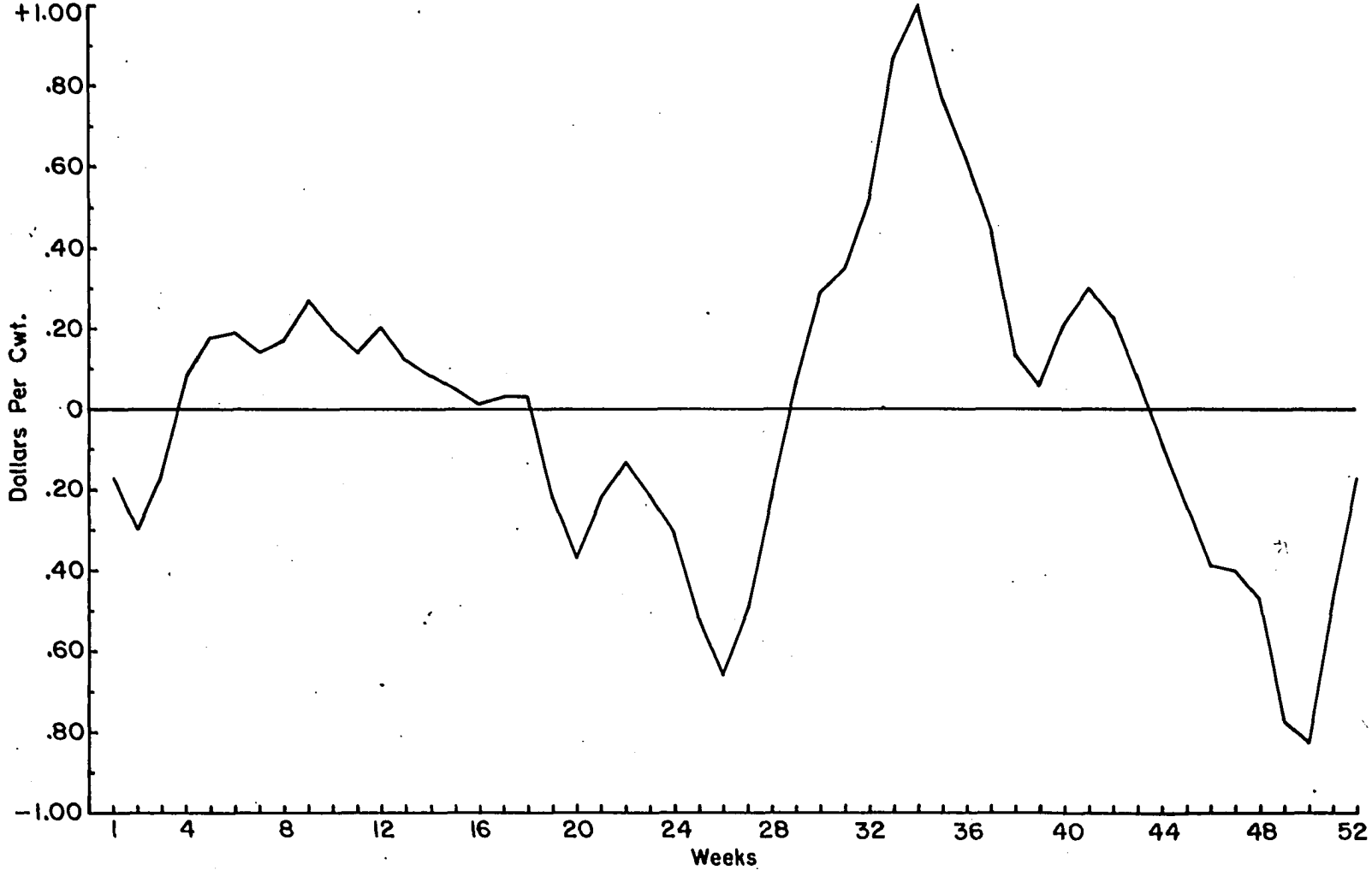


Figure 15. Deviations of the estimated price from the actual price for the 240-270 pound weight class of slaughter hogs at Sioux City, 1959

Figure 16. Deviations of the estimated price from the actual price for the 180-200 pound weight class of slaughter hogs at the Interior markets of Iowa and Southern Minnesota, 1959

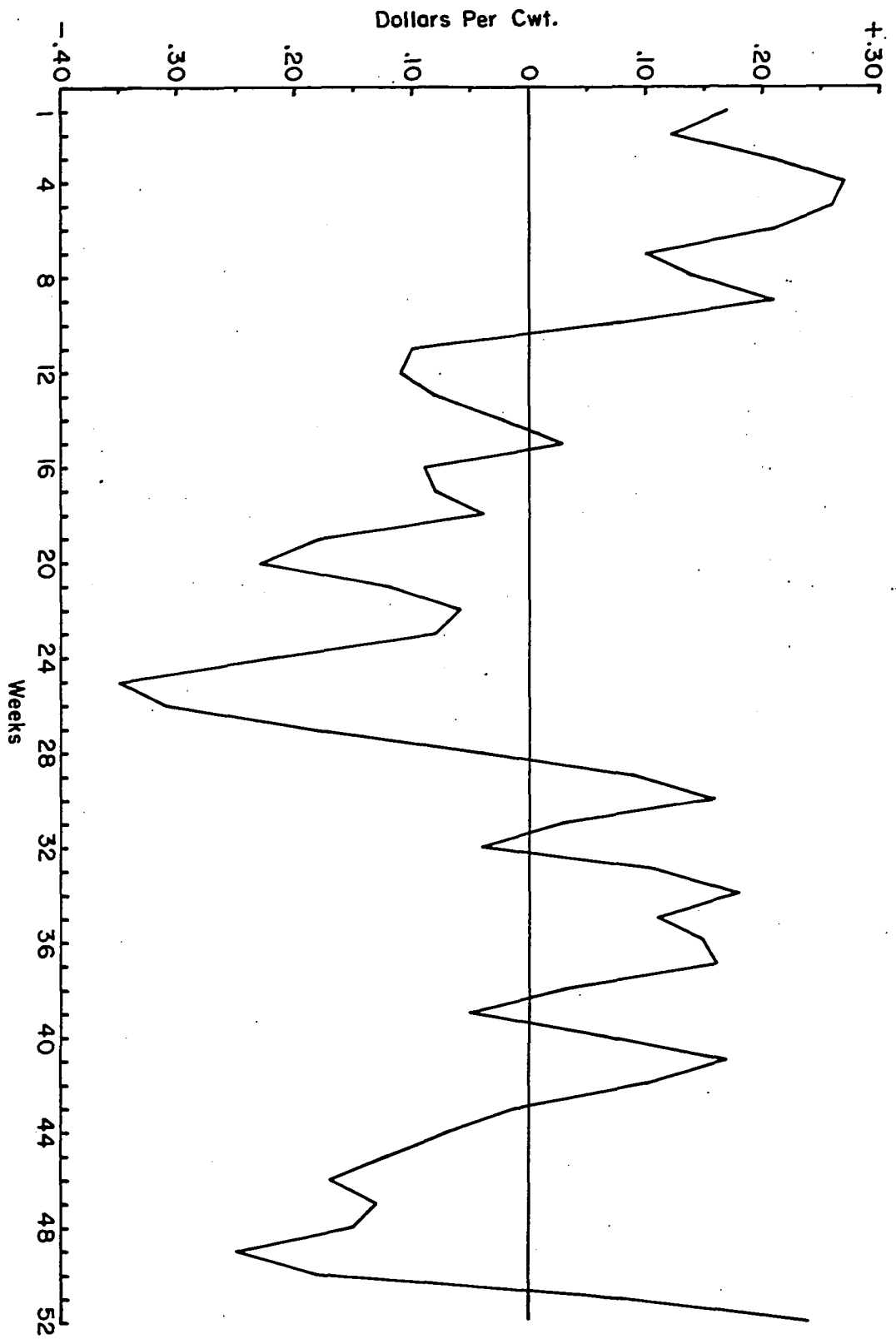

Dollars Per Cwt.
-.40
.30
.20
.10
0
.10
.20
+.30
Weeks
1
4
8
12
16
20
24
28
32
36
40
44
48
52

Figure 17. Deviations of the estimated price from the actual price for the 200-220 pound weight class of slaughter hogs at the Interior markets of Iowa and Southern Minnesota, 1959

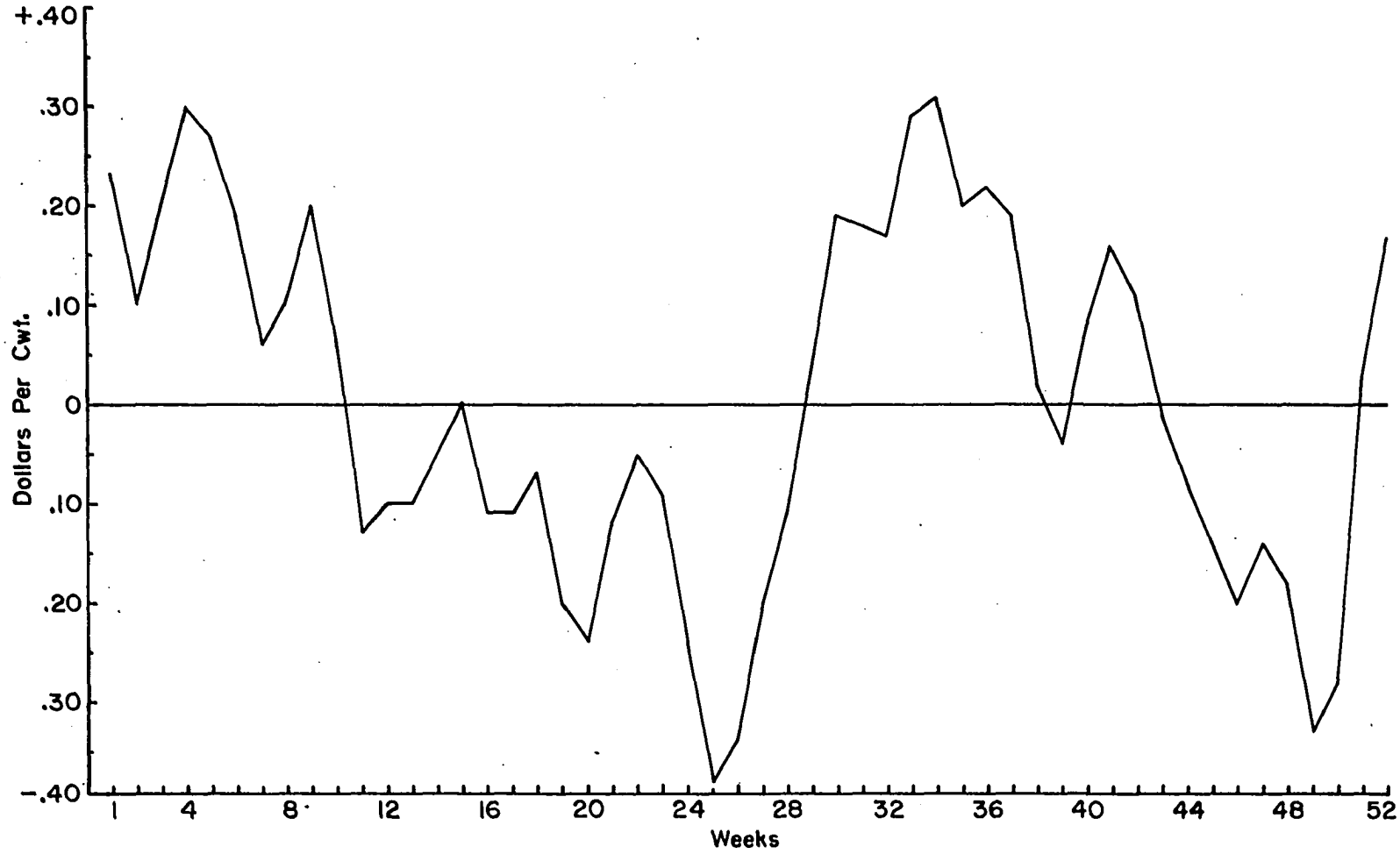

+.40
.30
.20
.10
0
.10
.20
.30
-.40
Dollars Per Cwt.
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Figure 18. Deviations of the estimated price from the actual price for the 220-240 pound weight class of slaughter hogs at the Interior markets of Iowa and Southern Minnesota, 1959

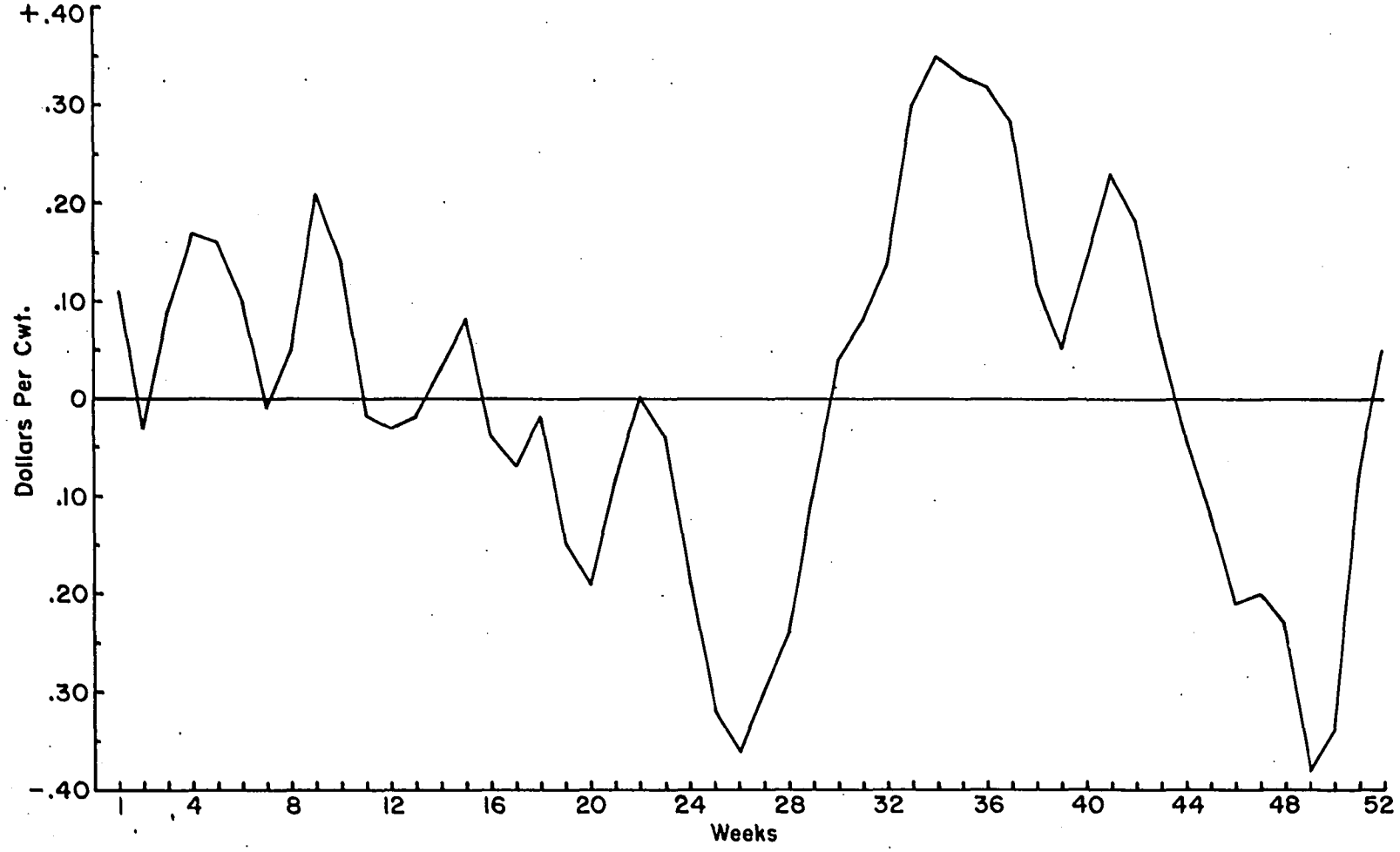

+.40
.30
.20
.10
0
.10
.20
.30
-.40
Dollars Per Cwt.
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Figure 19. Deviations of the estimated price from the actual price for the 240-270 pound weight class of slaughter hogs at the Interior markets of Iowa and Southern Minnesota, 1959

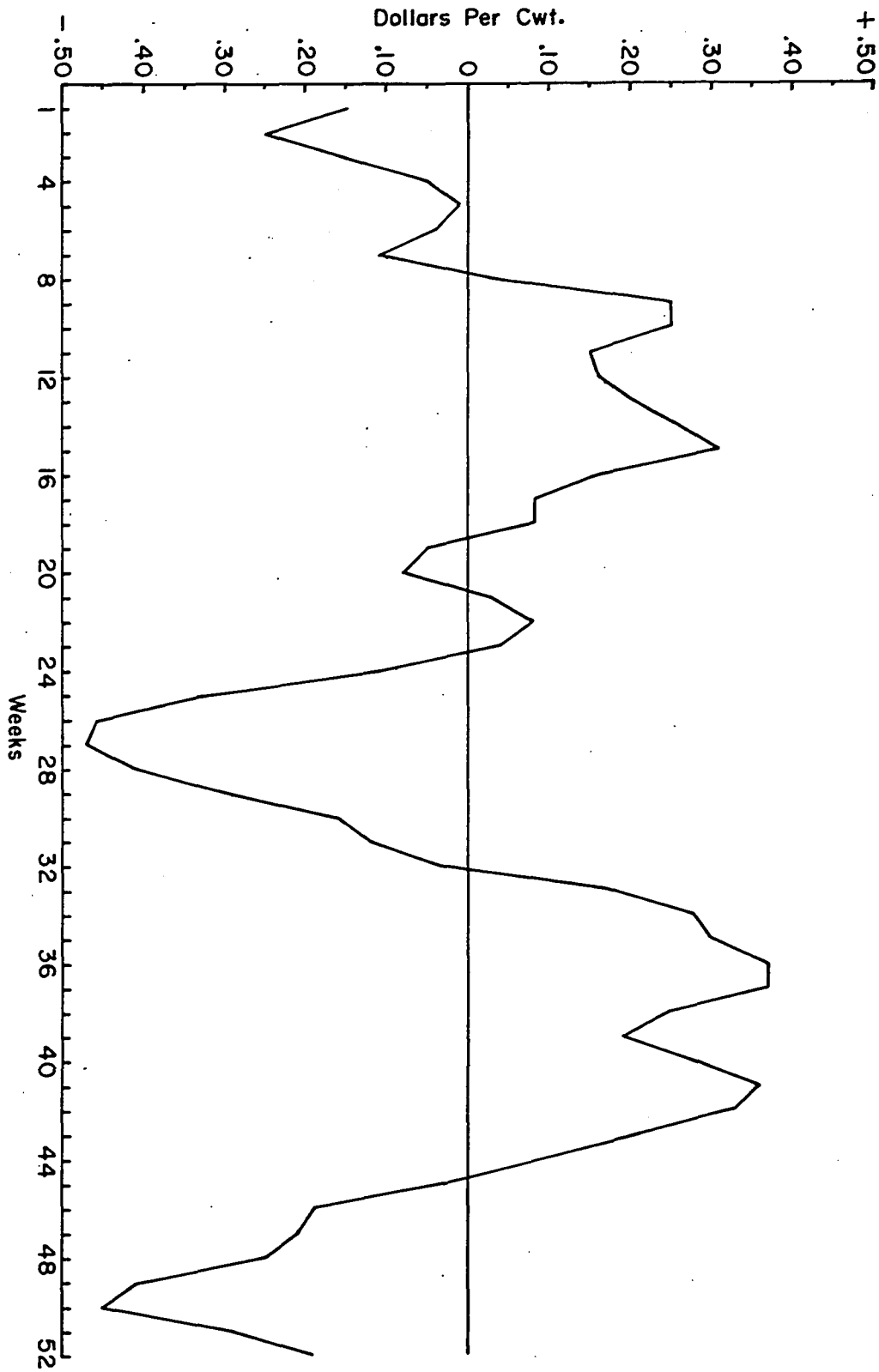

Dollars Per Cwt.
-.50
-.40
-.30
-.20
-.10
0
.10
.20
.30
.40
+.50
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Table 14. Estimated effects on price variables, in dollars per 100 pounds, of a 1-unit change in selected explanatory variables of hogs, for specified weight classes, Chicago, Sioux City, and Interior markets, 1960

Dependent variable $\hat{X}_i$	Equation number	Effect on live price of a 1-unit change		Constant term 1	R^2
		X_{12}	X_{13}		
$\hat{X}_1$	12	0.9992** (0.0106)	0.08 (0.32)	-0.2462	0.995
$\hat{X}_2$	13	0.9815** (0.0117)	0.75* (0.32)	0.1423	0.993
$\hat{X}_3$	14	1.0213** (0.0183)	0.42 (0.48)	-0.7080	0.986
$\hat{X}_4$	15	0.9532** (0.0225)	1.01 (0.80)	0.5294	0.974
$\hat{X}_5$	16	0.9362** (0.0248)	1.06 (0.69)	0.7536	0.967
$\hat{X}_6$	17	0.8626** (0.0323)	1.77 (0.89)	1.5615	0.937
$\hat{X}_7$	18	0.9477** (0.0131)	0.87* (0.36)	-0.5040	0.991
$\hat{X}_8$	19	0.9304** (0.0153)	1.27** (0.42)	0.3102	0.987
$\hat{X}_9$	20	0.9047** (0.0154)	1.17** (0.43)	0.4691	0.986
$\hat{X}_{10}$	21	0.8776** (0.0202)	0.89 (0.56)	0.4393	0.975

*Significantly different at the 0.05 level of probability.

**Significantly different at the 0.01 level of probability.

The prediction equations are summarized in Table 14. Substitution into the equations (Table 14) was done to compute the estimated price of slaughter hogs by two weight classes at Chicago, and four weight classes each at Sioux City and the Interior markets.

The deviations of the estimated weekly price of slaughter hogs are shown for 1959 in Figures 10 to 19. In addition, the average weekly price, the standard deviation of the errors of estimate and the average absolute deviations are summarized in Table 15.

Both the standard and average absolute deviations were at a minimum for the 180-200 and 220-240 pound weight classes at Chicago. The Interior markets had the next lowest standard and average absolute deviations, followed by Sioux City. It will be noted that these deviations were in ascending order, beginning with the 180-200 pound weight class. The interspatial and intemporal price differentials by weight class can be observed in the price at Chicago, Sioux City and the Interior markets. The lowest average weekly price was in the Interior markets during 1959. The price differentials by weight classes, by markets, may be attributed to the supply of and the demand for the different cuts of meat and other factors.

Table 16 emphasizes the precision with which the estimates were made. In all of the weight classes for which

Table 15. Average weekly price, in dollars per 100 pounds, standard deviations of the errors of estimates, and average absolute deviations of the estimates for weekly price of slaughter hogs, by weight classes at Chicago, Sioux City, and Interior markets, 1959

Market and weight class	Average weekly price	Standard deviation of estimates	Average absolute deviation of the estimates
Chicago			
X_1 (180-200)	14.82	0.12	0.09
X_2 (220-240)	15.12	0.14	0.11
Sioux City			
X_4 (180-200)	15.05	0.20	0.18
X_5 (200-220)	15.08	0.27	0.21
X_6 (220-240)	15.04	0.29	0.23
X_7 (240-270)	14.73	0.38	0.24
Interior markets			
X_8 (180-200)	13.96	0.15	0.13
X_9 (200-220)	14.51	0.18	0.16
X_{10}(220-240)	14.28	0.18	0.15
X_{11}(240-270)	13.83	0.24	0.20

Table 16. Frequency distribution of error in estimating weekly price per 100 pounds of slaughter hogs, 1959

Market and weight class	Item	Size of error in cents					
		0-20	21-40	41-60	61-80	81-100	Over 100
Chicago							
180-200#	Number	48	4				
	Per cent	92.3	7.7				
220-240#	Number	42	10				
	Per cent	80.8	19.2				
Sioux City							
180-200#	Number	33	19				
	Per cent	63.5	36.5				
200-220#	Number	31	14	5	2		
	Per cent	59.6	26.9	9.6	3.9		
220-240#	Number	26	16	8	2		
	Per cent	50.0	30.8	15.4	3.8		
240-270#	Number	24	15	6	4	3	
	Per cent	46.2	28.8	11.5	7.7	5.8	
Interior markets							
180-200#	Number	41	11				
	Per cent	78.8	21.2				
200-220#	Number	39	13				
	Per cent	75.0	25.0				
220-240#	Number	36	16				
	Per cent	69.2	30.8				
240-270#	Number	28	19	5			
	Per cent	53.9	36.5	9.6			

estimates were made, except one, from 50 to 92 per cent of the errors were less than 20 cents. The estimating errors were more widely dispersed in the Sioux City market. The first weight class was the only one in which all of the estimating errors were under 40 cents.

Regional weekly price estimates, 1959 and 1960

The estimates for 1960 included only the 200-220 pound weight class for Sioux City and the Interior markets. The 1959 measurement of estimating error for the same weight class and markets is presented as a basis for checking the precision of the estimates.

The deviations of the estimated weekly price of the 200-220 pound weight class of slaughter hogs, for Sioux City and the Interior markets during 1960 are presented in Figures 20 and 21. The average weekly price, the standard deviation and the average absolute deviations for both 1959 and 1960 are summarized in Table 17.

The estimates for the 200-220 pound weight class of slaughter hogs were slightly less precise for the 1960 prices on the Sioux City market. Estimates made for the Interior markets were slightly less precise for 1960, as shown in Table 18.

Figure 20. Deviation of the estimated price from the actual price for the 200-220 pound weight class of slaughter hogs at Sioux City, 1960

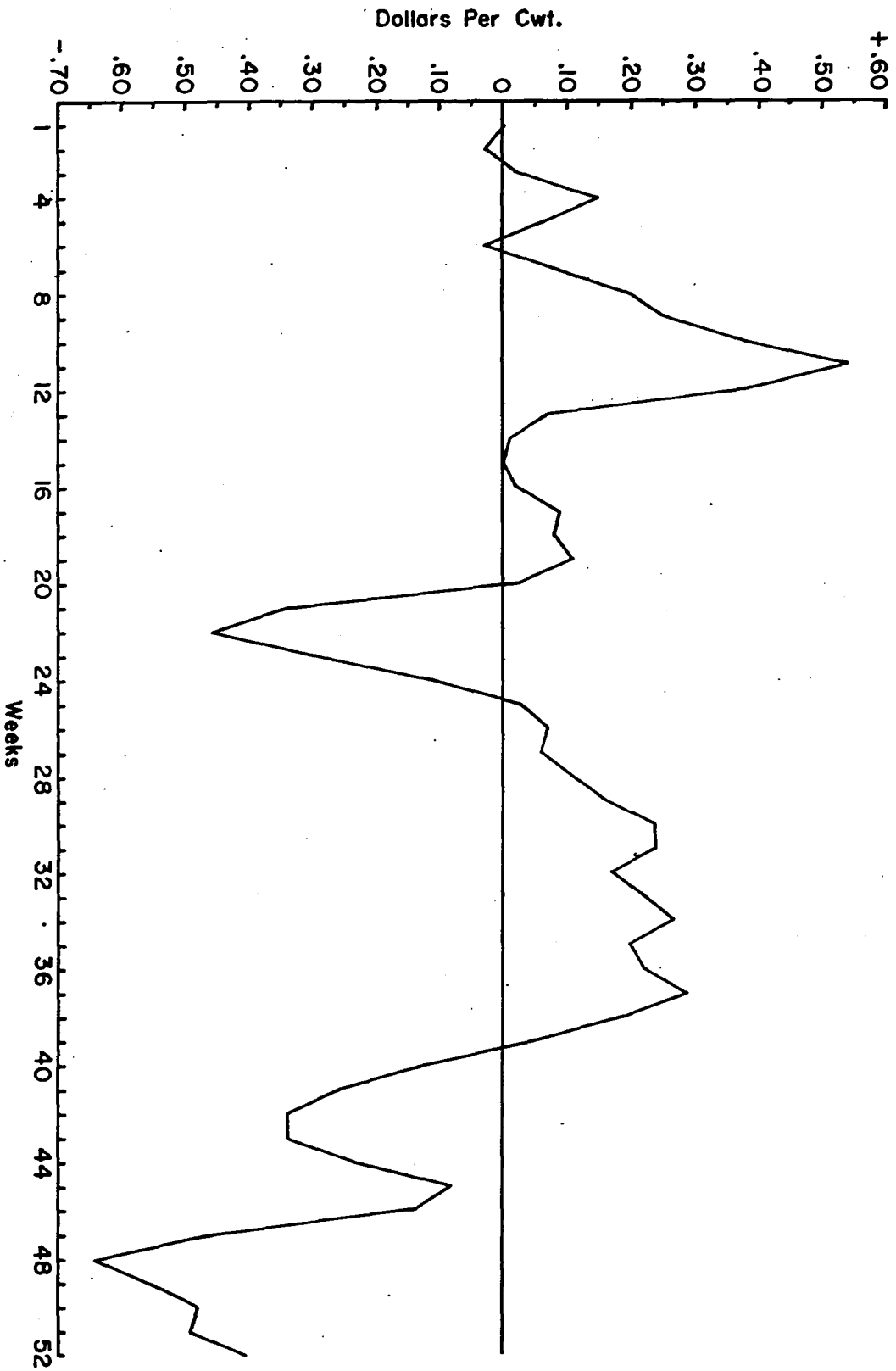

Dollars Per Cwt.
-.70
.60
.50
.40
.30
.20
.10
0
.10
.20
.30
.40
.50
+.60
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Figure 21. Deviations of the estimated price from the actual price for the 200-220 pound weight class of slaughter hogs, Interior markets of Iowa and Southern Minnesota, 1960

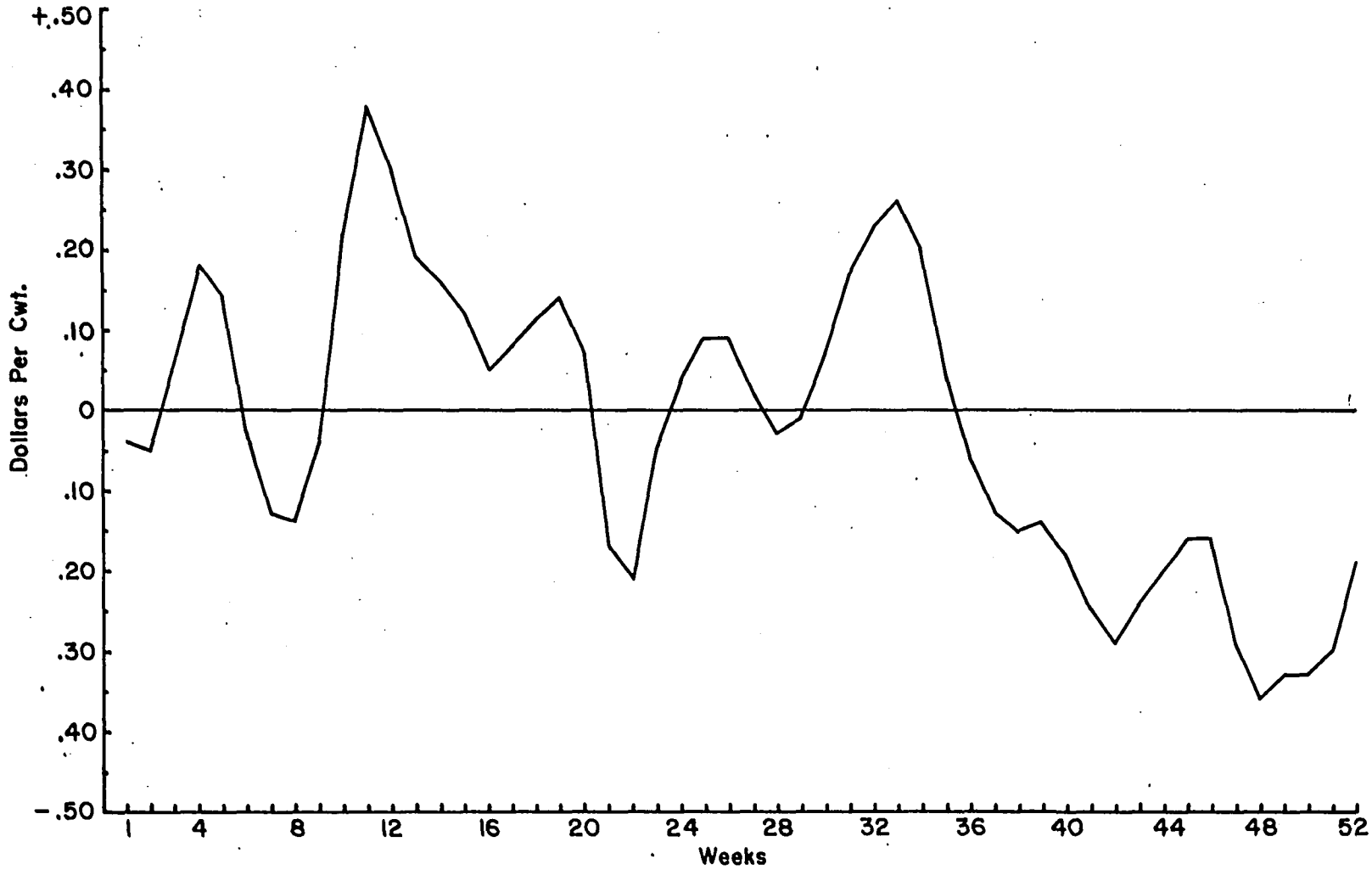

+.50
.40
.30
.20
.10
0
.10
.20
.30
.40
-.50
Dollars Per Cwt.
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Table 17. Average weekly price, in dollars per 100 pounds, standard deviation of the errors of estimates and average absolute deviations of the estimates for weekly price for the 200-220 pound weight class at Sioux City and Interior markets, 1959 and 1960

Market and year	Average weekly price	Standard deviation of estimates	Average absolute deviation of the estimates
Sioux City			
1959	15.08	0.27	0.21
1960	15.09	0.26	0.21
Interior markets			
1959	14.51	0.18	0.16
1960	14.51	0.18	0.16

Table 18. Frequency distribution of errors in estimating weekly price per 100 pounds for the 200-220 pound weight class of slaughter hogs, 1959 and 1960

Market and year	Item	Size of error in cents					
		0-20	21-40	41-60	61-80	81-100	Over 100
Sioux City							
1959	Number	31	14	5	2		
	Per cent	59.6	26.9	9.6	3.9		
1960	Number	26	19	6	1		
	Per cent	50.0	36.5	11.6	1.9		
Interior markets							
1959	Number	39	13				
	Per cent	75.0	25.0				
1960	Number	36	15	1			
	Per cent	69.2	28.9	1.9			

Regional supply estimates, 1959 and 1960

The multiple regression equation cited earlier that was based on the 1959 data was used to estimate weekly hog receipts at (1) the 12 markets and (2) the Interior markets.

The regression equations were of the form,

$$X_{14} = a_2 + b_{21}X_{16} + b_{22}X_{17}, \quad (11)$$

$$X_{15} = a_2 + b_{21}X_{16} + b_{31}X_{17} + b_{41}X_{18}. \quad (12)$$

The prediction equations were

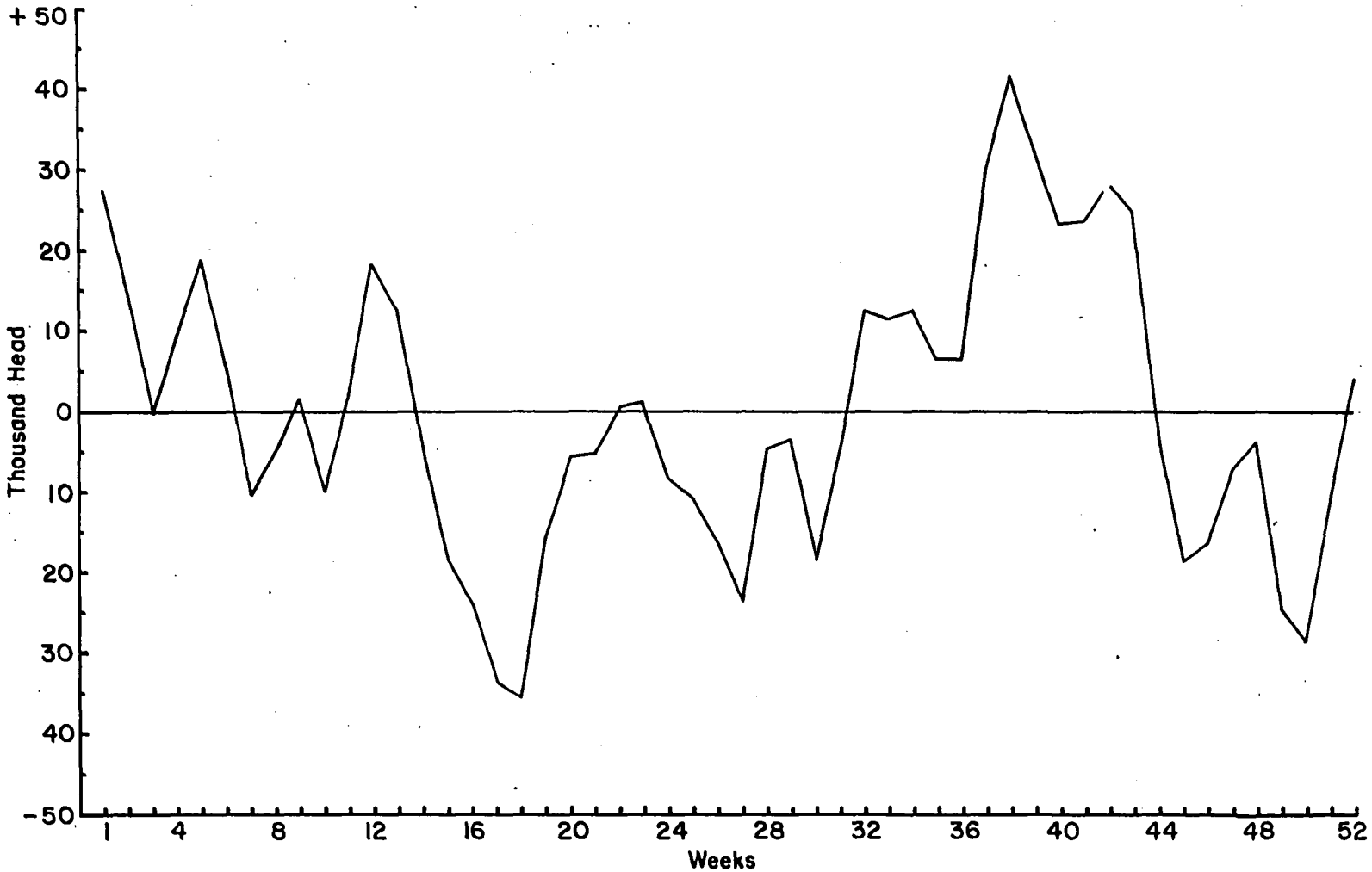
$$\hat{X}_{14} = 53{,}221.541 + 0.230X_{16} - 1042.102X_{17}, \quad (13)$$

$$\hat{X}_{15} = 462.426 + 317398X_{16} + 3.478X_{17} - 528.018X_{18}, \quad (14)$$

with an R^2 of 0.838 and 0.901, respectively. Substitution into these equations was done to compute the estimated total weekly receipts for 1959 and 1960.

The deviations of the estimated weekly receipts for the 12 markets are shown for 1959 and 1960 in Figures 22 and 23. Moreover, the standard deviations of the errors of estimate and the average absolute deviation are shown in Table 19.

During 1959, the standard deviation of the receipts was 15,834 head of slaughter hogs at the 12 markets, which was



66-86

Figure 22. Deviations of the estimated total weekly receipts for 12 markets from the actual receipts, 1959

Figure 23. Deviations of the estimated total weekly receipts for 12 markets from the actual receipts, 1960

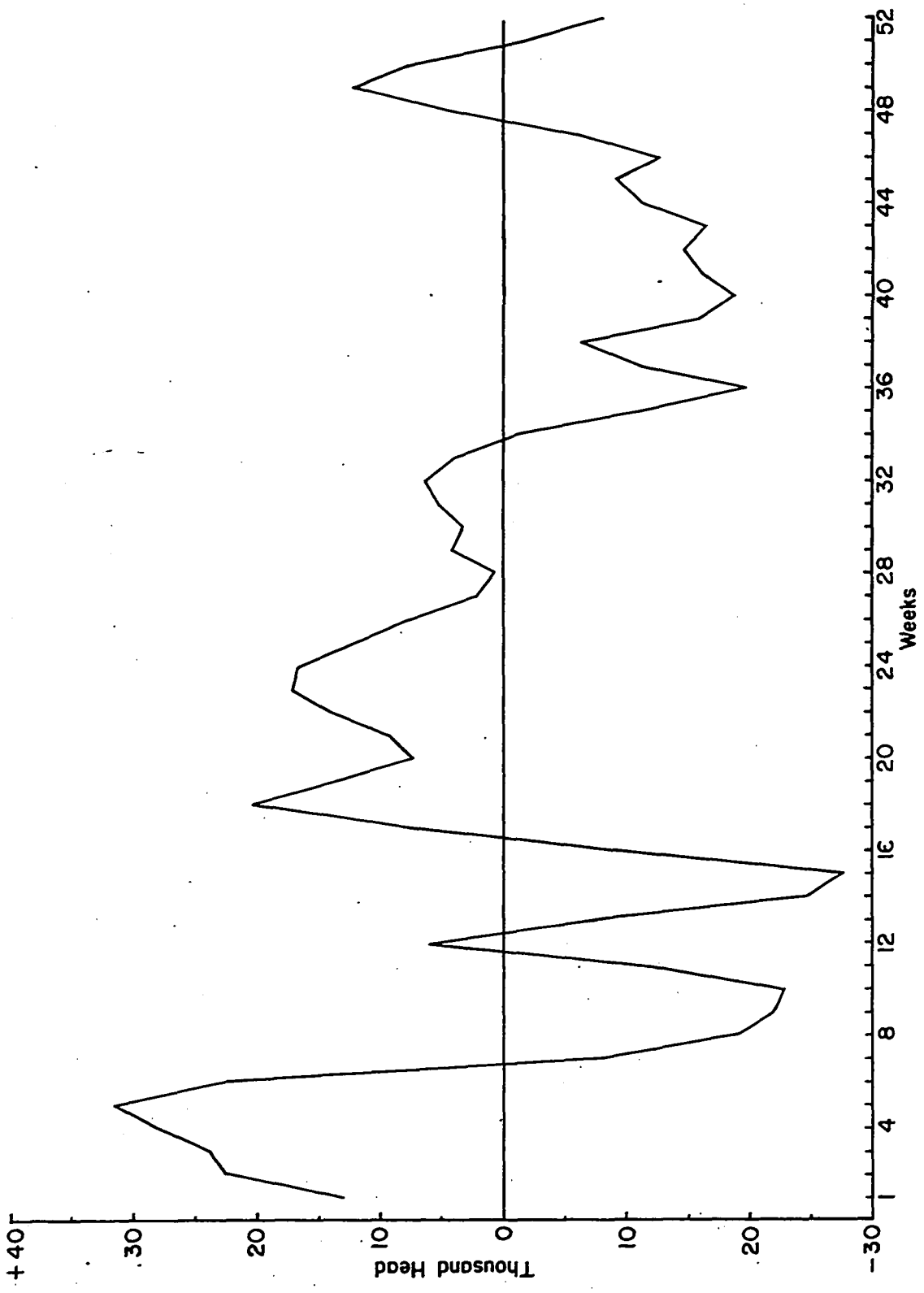

+40
30
20
10
0
10
20
-30
Thousand Head
1
4
8
12
16
20
24
28
32
36
40
44
48
52
Weeks

Table 19. Average weekly hog receipts for 12 markets; standard deviation of the errors of estimates, and average absolute deviations of the estimates, 1959 and 1960

Year	Average weekly receipts 12 markets (number)	Standard deviation of estimates (number)	Average absolute deviation of the estimates (number)
1959	353,061	15,834	13,932
1960	317,100	14,853	12,617

slightly more than the standard deviation for 1960. The average absolute deviation was 13,932 head for 1959 compared with 12,217 head for 1960.

The estimating errors at the 12 markets for 1959 and 1960 are summarized in Table 20. The size distribution of the observed residual terms is about the same for the two years, as illustrated by the summary data.

The deviations of the estimated weekly receipts for the Interior markets are presented for 1959 and 1960 in Figures 24 and 25. In addition, the standard deviations of the errors of estimate and the average absolute deviations are shown in Table 21. According to the data in Table 21, the average weekly receipts at the Interior markets were less during 1960 and both the standard deviation of estimate and the average absolute deviation of estimate were greater than the comparative figures for 1959.

Table 20. Frequency distribution of errors in estimating the total weekly receipts at 12 markets, 1959 and 1960

Size of error	1959		1960	
	Number	Per cent	Number	Per cent
0 to 10,000	19	36.5	22	42.3
10,001 to 20,000	22	42.3	20	38.5
20,001 to 30,000	11	21.2	9	17.3
30,001 to 40,000	0	0.0	1	1.9
40,001 to 50,000	0	0.0	0	0.0
Over 50,000	0	0.0	0	0.0
Total	52	100.0	52	100.0

Table 21. Average weekly hog receipts for the Interior markets; standard deviation of the errors of estimates and average absolute deviations of the estimates, 1959 and 1960

Year	Average weekly receipts Interior markets (number)	Standard deviation of estimates (number)	Average absolute deviation of the estimates (number)
1959	363,930	17,710	14,325
1960	345,644	19,522	16,450

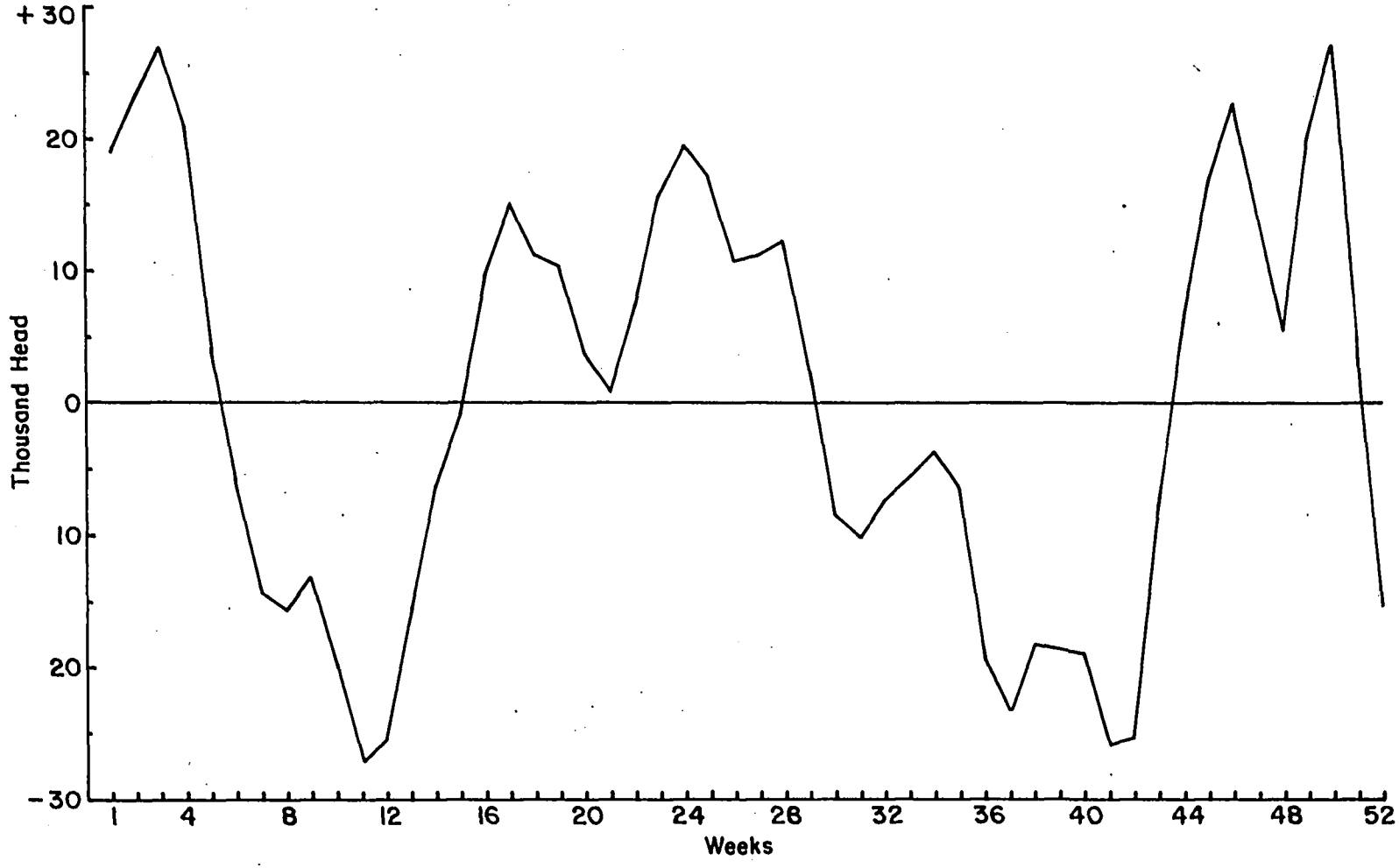


Figure 24. Deviations of the estimated total weekly receipts for the Interior markets of Iowa and Southern Minnesota, 1959

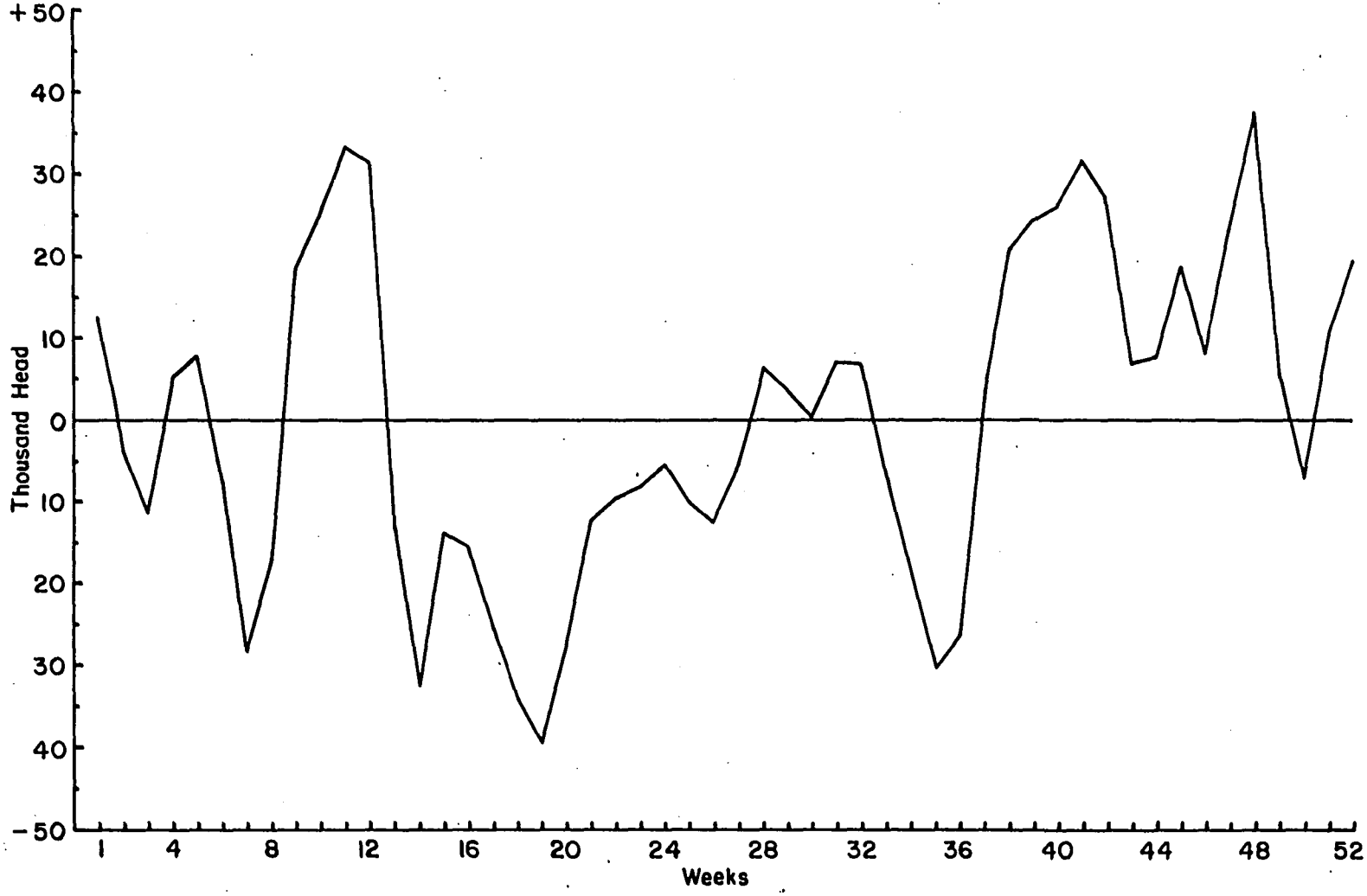


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Figure 25. Deviations of the estimated total weekly receipts for the Interior markets of Iowa and Southern Minnesota, 1960

Table 22-23. Frequency distribution of errors in estimating the total weekly receipts at the Interior markets, 1959 and 1960

Size of error	1959		1960	
	Number	Per cent	Number	Per cent
0 to 10,000	21	40.4	20	38.5
10,001 to 20,000	17	32.7	14	26.9
20,001 to 30,000	9	17.3	10	19.2
30,001 to 40,000	4	7.7	8	15.4
40,001 to 50,000	1	1.9	0	0.0
Over 50,000	0	0.0	0	0.0
Total	52	100.0	52	100.0

The size distribution of the observed residual terms for the weekly receipts predictions is summarized in Table 22-23. According to these summary data, the residual terms were somewhat larger for 1960 than for 1959. For example, slightly over 73 per cent of the estimating errors were less than 20,000 head in 1959, compared with about 65 per cent of the estimating errors with less than 20,000 head in 1960.

REDUCING SHORT-TERM PRICE VARIABILITY

Improving Market Information

The two separate models pertaining to weekly market variability which are shown under the empirical analysis can be developed to predict week-to-week changes in specified market prices and quantities. These two models include, first, an aggregate or national model depicting price and quantity changes on a national level and, second, a regional model in which the dependent variables in the national model will become explanatory variables to explain week-to-week changes in specified regional prices and marketings. The regional analysis would be applicable specifically to the Interior Iowa and Southern Minnesota markets.

The following four prediction equations developed under the empirical analysis are presented here in simplified form. These equations, where satisfactory results were obtained, can be developed ultimately to predict week-to-week changes with a rather high degree of precision and accuracy.

United States demand relationships

The empirical results show the week-to-week changes in the price of slaughter hogs were explained in 1955 ($R^2 = 0.691$) more effectively than during 1956, 1957, 1958,

and 1959, by the two variables--the difference between weekly federally inspected slaughter and average quarterly slaughter at the weekly rate for hogs, and the difference between federally inspected slaughter and average quarterly slaughter at the weekly rate for cattle and calves. For the 5-year period, 1955-59, the range of R^2 was about 15 per cent with the smallest R^2, 0.545, in 1959. The low coefficients of multiple correlation show the need for additional work on the aggregate model inasmuch as all of the major factors have not been included that influence or may be associated with the difference between the weekly price for the 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class at Chicago.

The algebraic form of the equation for which empirical relationships have been developed is represented as follows:

$$\Delta X_1 = a + b_{11}\Delta X_2 + b_{12}\Delta X_3, \qquad (15)$$

where

ΔX_1 = difference between price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class of hogs at Chicago

ΔX_2 = difference between weekly federally inspected slaughter of hogs and average weekly federally inspected slaughter of hogs over a specified 13-

week period

ΔX_3 = difference between federally inspected slaughter of beef cattle and average weekly federally inspected slaughter of beef cattle over a specified 13-week period.

United States supply relationships

The empirical results showed that the aggregate supply prediction equation was quite satisfactory in explaining week-to-week changes in federally inspected slaughter, as suggested by the range of the multiple correlation coefficients, R^2, from 0.87 to 0.95. During 1955, for example, the two variables--lagged weekly slaughter hogs, $(Q'_{3(w-1)t} - Q'_{3t})$--explained 0.95 per cent of the variation in the dependent variable Q'_{3wt}, during the 52-week period. For the lagged weekly slaughter hogs in 1959, a 1-unit change was associated with a 0.9372-unit change in the dependent variable.

The algebraic form of the supply model for which empirical results have been developed is represented as follows:

$$X_4 \; a + b_{11}X_5 + b_{12}X_6, \tag{16}$$

where

X_4 = weekly federally inspected slaughter of hogs

$X_5 = X_4$ lagged one week

X_6 = X_1 lagged one week

Regional demand relationships

In this component of the weekly model, weekly prices at Chicago, Sioux City and the Interior markets are essentially a function of the price of 200-220 pound barrows and gilts at Chicago during the same week. In addition, the change from the preceding week in the quantity of federally inspected slaughter of hogs was presumed to affect the weekly price levels.

According to the empirical results, the two variables, average weekly price, Chicago, 200-220 pound weight class, and change in federally inspected slaughter from the previous week were highly associated with the live price of slaughter hogs by the three weight classes at Chicago and the four weight classes at Sioux City and the Interior markets during the 5-year period, 1955-59. The coefficients of multiple determination, R^2, ranged from 93 to 99 per cent during 1957 and 1959 for these same variables.

This model could be used quite effectively to improve the precision of price forecasting by weight classes for the Chicago, Sioux City and the Interior Iowa and Southern Minnesota markets.

The algebraic form of the regional price model is shown by the equation,

$$X_i = a + b_{11}X_{12} + b_{12}X_{13}, \qquad (17)$$

where

X_i = weekly price per hundred pounds of i-th market class, (i = 1.....11)

X_{12} = weekly price per hundred pounds, 200-220 pound slaughter barrows and gilts, Chicago

X_{13} = change from preceding week in federally inspected hogs, United States.

Regional supply relationships

A major portion of the weekly hog receipts in the North-central region is represented by the hog receipts by the 12 markets listed by the weekly livestock market news and the hog receipts for the Interior markets. For this reason, two supply equations were constructed to show weekly receipts for these two sets of markets.

The empirical results disclose that federally inspected slaughter and change from one quarter to the next were highly associated with the total weekly hog receipts for the 12 markets during 1955, 1956, and 1957. The range of the R^2 for these variables during the three years was 88.7 to 92.2 per cent.

The empirical results for the supply equation of the Interior markets disclose that the three independent vari-

ables, federally inspected slaughter, quarter (T = 1,2,3,4) and difference in price of the 200-220 pound weight class at the Interior markets, last week over preceding week, were highly associated with total weekly hog receipts for the Interior markets. The R^2's ranged from 90.0 to 98.8 per cent for the 5-year period, 1955-59.

The very satisfactory results obtained from the prediction equation for both sets of markets suggest that the equations also could be used effectively to improve the efficiency of existing short-term forecasting of the hog market. Algebraically the equations were as follows:

$$X_{14} = a + b_{11}X_{16} + b_{12}X_{17}, \tag{18}$$

and

$$X_{15} = a + b_{11}X_{16} + b_{12}X_{17} + b_{13}X_{18}, \tag{19}$$

where

X_{14} = total weekly hog receipts for 12 markets

X_{15} = total weekly hog receipts for Interior markets

X_{16} = federally inspected slaughter hogs

X_{17} = t-th quarter (T = 1,2,3,4)

X_{18} = difference in price, 200-220 pound barrows and gilts, Interior market last week (w-1) over

preceding week (w-2).

The predicted values of the equations could then be used in short-term planning of both livestock and meat distribution activities. The distribution process could be rationalized on either an individual or a group basis.

Alternative Forms of Decision Making

Independent decision making

A private or quasi-public outlook service could prepare the weekly forecast for a selected clientele. The weekly forecasts then could be used by the individuals patronizing the service to select (1) the appropriate market at which to sell the livestock and (2) the appropriate time to sell the livestock. The individual users of this service, however, would have only information showing weekly price differentials by market and quality class. Prospective daily differentials in prices would need to be ascertained in some other manner, though the realization of the predicted weekly values would give some notion of probable changes in the daily prices during the latter part of the week.

Group decision making

Marketing associations of producers or an agricultural business service association of the same producers could

prepare the weekly outlook information for the members of the association. If the service association was an integral part of the business units, or farms, comprising the association, then the individual production decisions that were made by the members of this association would no longer represent the independent decision making in the same sense as was represented in the first alternative cited earlier. Thus, the predicted values obtained from the empirical procedures used by the outlook specialists would be subject to some further modification in the process of group interaction. If this interacting process were no different from the interaction among the independent decision makers, they would have, nevertheless, exchanged views on prospective market conditions from time to time. In either case, the number of individuals involved would be too small to affect the forecast values, unless the identical services, or nearly identical, were provided on a regional or national basis.

Establishing Market Contracts

Cyclical and seasonal variability in the livestock markets may be reduced sufficiently to encourage the development of forward pricing schemes under market contracts between producers and processors. Further improvements in reducing short-term market variability would assist in a more

efficient distribution of livestock from farms to packing plants in terms of both quality of livestock and place of marketing. The more rational distribution of the product, however, could be achieved on either an individual or a group basis.

Individual decision making

Individual processing plants could direct the flow of livestock from farm to place of slaughter in accordance with the contract terms. Thus, livestock could be procured from the more distant producers to take advantage of short-term geographic price differentials. Intertemporal quality differentials also could be taken into account in the more rational procurement procedures.

Group decision making

The individual producers and the individual processors could be organized into marketing or bargaining associations and function as oligopsonists or oligopolists in their response to short-term changes in market prices and supplies. Improvements in market information, presumably, would make possible the attainment of greater precision in the pricing process from the standpoint of either party to the contract and thus would contribute to increased efficiencies.

SUMMARY AND CONCLUSIONS

The primary objective of this study was to ascertain quantitatively the association between short-term, or weekly, variability in the hog market and quarter-year variability during any one quarter-year covering the 5-year period, 1955 through 1959. For the most part, this objective was achieved by constructing a series of linear regression equations and by examining the explained variation in the dependent variable in each equation. Prediction equations for 1959 were used to estimate prices, federally inspected slaughter, and receipts at 12 major markets and the Interior markets. The predicted value obtained was compared with the original value and the residuals obtained for each week.

A secondary objective was established, namely, to relate the quantitative findings to alternative procedures for reducing the undesirable effects of short-term market variabilities in slaughter hogs. Procedures for improving market information and for establishing marketing contracts were examined and evaluated in terms of both individual and group decision making.

As a general framework for subsequent studies dealing with short-term market variability in livestock, a quarterly model was prepared in an earlier study by Wilbur R. Maki and Charles Y. Liu (11). The endogenous mechanism of both the

cattle and hog cycle was described in the earlier study. In this report, therefore, only changes in weekly prices and supplies were discussed. Accordingly the analytical approach has two separate models pertaining to weekly market variability, namely, a model depicting weekly price and quantity changes on a national level and another model depicting corresponding changes on a regional level.

Empirical Results

The national model shows week-to-week changes in specified prices and quantities as a function of changes in total federally inspected slaughter in the U. S. The model is composed of two parts, namely, a price prediction equation and a quantity prediction equation. In both equations, the difference between the weekly price of the 200-220 pound barrows and gilts at Chicago and the average quarterly price for the same weight class in the same market and reported weekly federally inspected slaughter are used as dependent or explanatory variables.

Week-to-week changes in the difference between reported weekly price and the predicted average price over a specified 13-week period are explained largely by week-to-week changes in the difference between reported weekly federally inspected slaughter in the United States and a predicted average weekly

rate of federally inspected slaughter over a specified 13-week period. Part of the price variability, however, is explained by an additional variable denoting week-to-week change in the difference between reported weekly federally inspected slaughter of beef cattle and a corresponding average weekly federally inspected slaughter of beef cattle over a specified 13-week period. Week-to-week changes were explained more effectively in 1955 (R^2 = 0.691) by these two independent variables. The range of R^2 was about 15 per cent with an R^2 of 0.545 in 1959. The effect on the difference between the weekly price for 200-220 pound barrows and gilts at Chicago and average quarterly price for the same market class of hogs at Chicago (X_1) of a one-unit change in the difference between weekly federally inspected slaughter and average weekly federally inspected slaughter of hogs over a specified 13-week period during 1955 was -0.009, significantly different from zero at the 0.01 probability level. During 1959, however, the effect of a one-unit change of X_2 on X_1 was 0.018.

The multiple regression equation for the United States was quite satisfactory in explaining week-to-week changes in federally inspected slaughter during the period 1955-59. The R^2's ranged from 0.854 in 1958 to 0.951 in 1958. The effect of a one-unit change in weekly federally inspected slaughter hogs, the preceding week (X_5) on weekly federally inspected

slaughter hogs was, for example, 0.996 in 1955 and 0.937 in 1959.

In the regional model, the dependent variables in the national model became explanatory variables to explain week-to-week changes in specified regional prices and marketings. Only the West Northcentral region, primarily the Interior markets, is covered by the regional analysis.

The regression relationships (accounting for the unexplained variation in live price) were based on data covering the 5-year period, 1955-59.

The two variables, average weekly price, Chicago, 200-220 pound weight class, and change in federally inspected slaughter from the previous week, were highly associated with the live price of slaughter hogs by the three other weight classes at Chicago and the four weight classes at Sioux City and the Interior markets during the 5-year period, 1955-59. The range of association was from 93 to 99 per cent during 1957 and 1959 for these same variables.

In 1955, for example, a 1-unit change in the independent variable (average weekly price, Chicago, 200-220 pound weight class) was associated with a 1.031 unit change in the dependent variable--live price, Interior markets, 180-200 pound weight class.

The standard error of the regression coefficient was 0.020 units, the calculated value of t was substantially in

excess of the value $t_{.01}$, denoting a regression coefficient significantly different from zero at the 0.01 probability level. The b coefficients for the independent variable $P'^{1,2}_{3wt}$ were all significant at the 0.01 level.

Federally inspected slaughter and change from one quarter to the next were highly associated with the total weekly hog receipts for the 12 markets during 1955, 1956, and 1957. The ranges of R^2 for these variables during these years was 88.7 to 92.2 per cent. However, for the years 1959 and 1958 the R^2's were 82.9 and 83.7 percent, respectively.

In 1955, for example, a 1-unit change in the independent variable (federally inspected slaughter) was associated with a change of 0.302 in the dependent variable, total weekly hog receipts for 12 markets. A 1-unit change from quarter to quarter was associated with a change of 1184 in the dependent variable, total hog receipts.

The empirical results for the additional supply equation disclose that the three independent variables, federally inspected slaughter, quarter (T = 1,2,3,4) and difference in price of the 200-220 pound weight class at Interior markets, last week over preceding week, were highly associated with total weekly hog receipts for the Interior markets. The R^2's ranged from 90.0 to 98.8 per cent for the 5-year period, 1955-59.

During 1955, for example, a 1-unit change in federally inspected slaughter was associated with a change of 0.344 in the dependent variable, total weekly hog receipts for the Interior markets. A unit change from one quarter to the next was associated with a change of 5.051 in the dependent variable. A 1-unit increase in the difference in price of the 200-220 pound weight class at the Interior markets, last week over the preceding week, was associated with a decrease of 29,771 in the dependent variable, total weekly hog receipts for these markets.

During 1959, the standard deviation of the errors of the estimate for the difference between the weekly price for the 200-220 pound barrows and gilts at Chicago was 34 cents compared with a standard deviation of 79 cents in 1960. A few weeks in which the estimating error was exceptionally large accounted for a major part of the total error for 1959 and 1960. For example, five weeks during 1959, in which the estimating error was greater than 50 cents price difference, accounted for $3.58, or 60 per cent of the $5.98 total sum of squares of deviations. Over half of the estimating errors for 1959 were less than 20 cents, whereas 42 per cent of the estimating errors during 1960 were over 80 cents.

The standard deviations of the errors of estimate for the estimated weekly receipts of federally inspected slaughter during 1959 and 1960 were 57,900 and 64,830, respectively.

Six weeks during 1959, in which the estimating error was greater than 100,000 federally inspected slaughter, accounted for 114,138,140,000, or 65 per cent, of the 174,310,160,000 total sum of squares of deviation. Slightly over 44 per cent of the estimating errors were less than 20,000 head for both 1959 and 1960.

Substitution into the 1959 prediction price equations was done to compute the estimated prices of slaughter hogs for 1959 by two weight classes at Chicago, and four weight classes each at Sioux City and Interior markets, and for 1960 by the 200-220 pound weight class only at the Sioux City and the Interior markets.

Both the standard and average absolute deviations were at a minimum between the 180-200 and 220-240 pound weight classes at Chicago. The Interior markets had the next lowest standard and average absolute deviations, followed by Sioux City. These deviations are in ascending order, beginning with the 180-200 pound weight class. The interspatial and intertemporal price differentials are apparent in the Chicago, Sioux City, and Interior markets. The lowest average weekly price was in these same markets during 1959. The price differentials by weight classes and by markets may be attributed to the supply of and the demand for the different cuts of meat and other factors.

The estimates for 1959 were made with a high degree of

precision. In all of the weight classes, except one, for which estimates were made, in Chicago, Sioux City, and the Interior markets, from 50 to 92 per cent of the errors were less than 20 cents. The estimating errors were more widely dispersed in the Sioux City market. The first weight class was the only one in which all of the estimating errors were under 40 cents.

The estimates for the 200-220 pound weight class of slaughter hogs were slightly less precise for the 1960 prices on the Sioux City market. Estimates made for the Interior markets for 1959 and 1960 were almost identical.

The multiple regression equations used to estimate weekly hog receipts at the 12 markets and the Interior markets were based on the national regression equation. Substitution into these equations was done to compute the predicted values for 1959 and 1960.

During 1959, the standard deviation of the receipts was 15,834 head of slaughter hogs at the 12 markets, or 981 more than the standard deviation for 1960. The average absolute deviation was 13,932 for 1959 compared with 12,217 for 1960. Almost 79 per cent of the estimating errors were less than 20,000 head in 1959 compared with 81 per cent in 1960.

The average weekly receipts at the Interior markets were less during 1960 and both the standard deviation of estimate and the average absolute deviation of estimate were greater

than the comparative figures for 1959. The estimating errors were more precise for 1959. Slightly over 73 per cent of the estimating errors were less than 20,000 head compared with 65 per cent in 1960.

Procedures for Improving Market Information

The two separate models pertaining to weekly market variability which are shown under the empirical analysis can be developed to predict week-to-week changes in specified market prices and quantities. The weekly forecasts could be prepared either by a private or quasi-public outlook service for livestock producers to determine where to sell or when to sell the livestock. This information would show weekly price differentials by market and quality class.

The development of forward pricing schemes under market contracts between producers and processors may be the basis of reducing cyclical and seasonal variability in the marketing of livestock. A more rational distribution of livestock may be achieved on either an individual or a group basis.

Individual processors could schedule the livestock from farm to packing plant according to the terms of the contract. In accordance with the terms of a contract livestock could be obtained from the more distant producers to take advantage of short-term geographic price differentials. Intertemporal

quality differentials could also be considered under a contract.

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APPENDIX

Table 24. Analysis of variance of the average price differentials, per 1 classes of slaughter hogs at 74 Iowa markets, as obtained in a by week, area and days

Source of variation	d.f.	Mean square					
		180-200#	200-220#	220-240#	240-270#	180-200#	2
Week (A)	5	10.3678	9.6262	10.4333	13.1314	1339.26**	5
Area (B)	2	6.2997	2.1034	3.6082	4.2361	813.77**	1
Days (C)	4	0.0171	0.0089	0.0066	0.0014	2.21	
A x B	10	0.1383	0.0782	0.1293	0.2278	17.87**	
A x C	20	0.0384	0.0294	0.0327	0.0312	4.96**	
B x C	8	0.0287	0.0074	0.0138	0.0133	3.70**	
A x B x C	40	0.0077	0.0017	0.0042	0.0116		

**Significant at the 1% level.

ınce of the average price differentials, per 100 pounds, for four weight ıter hogs at 74 Iowa markets, as obtained in a six-week survey classified l days

Mean square			F			
200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
9.6262	10.4333	13.1314	1339.26**	5533.88**	2507.17**	1134.56**
2.1034	3.6082	4.2361	813.77**	1209.22**	867.05**	366.00**
0.0089	0.0066	0.0014	2.21	44.98**	31.06**	19.68**
0.0782	0.1293	0.2278	17.87**	5.09	1.60	0.12
0.0294	0.0327	0.0312	4.96**	16.94**	7.85**	2.70**
0.0074	0.0138	0.0133	3.70**	4.25**	3.32**	1.15
0.0017	0.0042	0.0116				

level.

Table 25. Analysis of variance of the average price differentials per 100 of slaughter hogs at 74 Iowa markets,[a] and Sioux City terminal

Source of variation	d.f.	Mean square 180-200#	200-220#	220-240#	240-270#	180-200#
Weeks (A)	5	13.5912	14.2716	12.1936	18.8684	1096.95**
Areas (B)						
Area 5 vs. others	1	5.8523	4.3626	0.1134	9.2032	472.34**
Among other areas	2	6.5043	2.1034	3.6282	4.2221	524.97**
Days (C)	4	0.0207	0.0194	1.8355	0.0065	1.67
AB	15	0.1163	0.1096	1.4500	0.1968	9.39**
AC	20	0.0426	0.0387	1.9653	0.0512	3.43**
BC	12	0.0334	0.0176	1.8089	0.0211	2.69**
R	60	0.0124	0.0064	1.6773	0.0156	

[a]Six-week survey.

[b]Data obtained from The Des Moines Tribune and The Des Moines Registe survey.

*Significant at the 5% level.

**Significant at the 1% level.

of the average price differentials per 100 pounds for four weight classes 74 Iowa markets,[a] and Sioux City terminal market[b]

Mean square			F			
200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
14.2716	12.1936	18.8684	1096.95**	2243.96**	7.27**	1207.96**
4.3626	0.1134	9.2032	472.34**	685.94**	0.07	589.19**
2.1034	3.6282	4.2221	524.97**	330.73**	2.16	270.30**
0.0194	1.8355	0.0065	1.67	3.05*	1.09	0.42
0.1096	1.4500	0.1968	9.39**	17.23**	0.86	12.60**
0.0387	1.9653	0.0512	3.43**	6.08**	1.17	3.27**
0.0176	1.8089	0.0211	2.69**	2.76**	1.08	1.35
0.0064	1.6773	0.0156				

s Moines Tribune and The Des Moines Register for actual dates of six-week

el.

el.

Table 26. Analysis of variance of the average price differentials per 100 pou of slaughter hogs at 74 Iowa markets,[a] and the Interior of Iowa and

Source of variation	d.f.	Mean square					
		180-200#	200-220#	220-240#	240-270#	180-200#	
Weeks (A)	5	12.9647	12.4207	13.5988	16.6497	1048.92**	299
Areas (B)							
Area 4 vs. others	1	1.8020	0.5499	0.9030	1.3298	145.79**	13
Among other areas	2	6.5043	2.1034	3.6282	4.2221	526.24**	50
Days (C)	4	0.0006	0.0085	0.0093	0.0086	0.48	
AB	15	0.1101	0.0602	0.0931	0.1679	8.91**	1
AC	20	0.0388	0.0331	0.0360	0.0340	3.14**	
BC	12	0.0341	0.0084	0.0114	0.0149	2.76**	
R	60	0.0124	0.0042	0.0057	0.0101		

[a]Six-week survey.

[b]Data obtained from The Des Moines Tribune and The Des Moines Register fo survey.

*Significant at the 5% level.

**Significant at the 1% level.

ariance of the average price differentials per 100 pounds for four weight classes hogs at 74 Iowa markets,[a] and the Interior of Iowa and Southern Minnesota markets[b]

Mean square				F			
180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
12.9647	12.4207	13.5988	16.6497	1048.92**	2992.95**	2377.41**	1656.68**
1.8020	0.5499	0.9030	1.3298	145.79**	132.51**	157.87**	132.32**
6.5043	2.1034	3.6282	4.2221	526.24**	506.85**	634.29**	420.11
0.0006	0.0085	0.0093	0.0086	0.48	2.06	1.63	0.86
0.1101	0.0602	0.0931	0.1679	8.91**	14.52**	16.27**	16.71**
0.0388	0.0331	0.0360	0.0340	3.14**	7.99**	6.29**	3.38**
0.0341	0.0084	0.0114	0.0149	2.76**	2.03*	1.99*	1.48
0.0124	0.0042	0.0057	0.0101				

The Des Moines Tribune and The Des Moines Register for actual dates of six-week

5% level.

1% level.

Table 27. Average market prices, in dollars per 100 pounds, for slaughter hogs b reported in a six-week survey of three areas[a]

Dates of survey[b]	Week and day	Area 1				Area 2				
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	1 2
Sept. 14-19, 1959	Week 1									
	Mon.	13.18	13.61	13.72	13.53	12.94	13.41	13.30	13.19	1
	Tues.	13.41	13.62	13.66	13.57	12.85	13.50	13.41	13.11	1
	Wed.	13.45	13.74	13.83	13.69	12.96	13.43	13.33	13.14	1
	Thurs.	13.25	13.57	13.67	13.58	12.63	13.31	13.20	13.07	1
	Fri.	13.50	13.64	13.69	13.61	12.82	13.29	13.20	13.01	1
	Ave.	13.36	13.64	13.71	13.60	12.84	13.39	13.29	13.10	1
Sept. 21-26, 1959	Week 2									
	Mon.	13.38	13.59	13.73	13.56	13.04	13.42	12.99	13.30	1
	Tues.	13.28	13.52	13.59	13.48	12.72	13.31	13.40	13.31	1
	Wed.	13.07	13.46	13.53	13.37	12.60	13.20	13.19	13.00	1
	Thurs.	13.19	13.39	13.55	13.36	12.88	13.31	13.26	13.03	1
	Fri.	13.53	13.69	13.75	13.64	12.96	13.39	13.32	13.09	1
	Ave.	13.29	13.53	13.63	13.48	12.84	13.33	13.23	13.15	1
Nov. 30-Dec. 5, 1959	Week 3									
	Mon.	12.09	12.24	12.17	11.67	11.32	11.70	11.58	10.80	1
	Tues.	11.91	12.21	12.03	11.59	11.26	11.88	11.77	11.31	1
	Wed.	12.09	12.31	12.07	11.54	11.44	11.89	11.66	11.37	1
	Thurs.	12.06	12.25	12.03	11.49	11.49	11.85	11.73	11.42	1
	Fri.	11.98	12.17	11.93	11.41	11.12	11.83	11.56	11.12	1
	Ave.	12.03	12.24	12.05	11.54	11.33	11.83	11.66	11.20	1
Dec. 7-12, 1959	Week 4									
	Mon.	11.97	12.25	12.09	11.63	11.67	11.90	11.72	11.23	1
	Tues.	12.07	12.21	12.04	11.66	11.54	11.91	11.66	11.16	1
	Wed.	12.09	12.20	11.97	11.37	11.27	11.82	11.60	11.29	1
	Thurs.	12.05	12.10	11.97	11.32	11.28	11.84	11.57	11.20	1
	Fri.	12.05	12.18	12.07	11.33	11.47	11.75	11.46	11.00	1
	Ave.	12.05	12.19	12.03	11.46	11.45	11.81	11.60	11.18	1

[a]Survey data from project NCM-18.

[b]Price data were omitted for Saturdays.

t prices, in dollars per 100 pounds, for slaughter hogs by weight classes as six-week survey of three areas[a]

	Area 1			Area 2				Area 3			
	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
8	13.61	13.72	13.53	12.94	13.41	13.30	13.19	12.71	13.32	13.14	12.70
1	13.62	13.66	13.57	12.85	13.50	13.41	13.11	12.88	13.43	13.29	12.96
5	13.74	13.83	13.69	12.96	13.43	13.33	13.14	12.92	13.46	13.29	12.98
5	13.57	13.67	13.58	12.63	13.31	13.20	13.07	12.98	13.40	13.12	12.83
0	13.64	13.69	13.61	12.82	13.29	13.20	13.01	12.75	13.24	13.09	12.81
6	13.64	13.71	13.60	12.84	13.39	13.29	13.10	12.85	13.37	13.19	12.86
8	13.59	13.73	13.56	13.04	13.42	12.99	13.30	12.61	13.18	13.05	12.64
8	13.52	13.59	13.48	12.72	13.31	13.40	13.31	12.74	13.24	13.01	12.71
7	13.46	13.53	13.37	12.60	13.20	13.19	13.00	12.56	13.09	12.90	12.65
9	13.39	13.55	13.36	12.88	13.31	13.26	13.03	12.68	13.17	12.97	12.77
3	13.69	13.75	13.64	12.96	13.39	13.32	13.09	12.73	13.29	13.16	12.55
9	13.53	13.63	13.48	12.84	13.33	13.23	13.15	12.66	13.19	13.02	12.66
9	12.24	12.17	11.67	11.32	11.70	11.58	10.80	11.06	11.82	11.69	11.34
1	12.21	12.03	11.59	11.26	11.88	11.77	11.31	11.14	11.87	11.70	11.24
9	12.31	12.07	11.54	11.44	11.89	11.66	11.37	11.15	11.90	11.79	11.35
6	12.25	12.03	11.49	11.49	11.85	11.73	11.42	11.19	11.89	11.83	11.34
8	12.17	11.93	11.41	11.12	11.83	11.56	11.12	10.97	11.78	11.61	11.19
3	12.24	12.05	11.54	11.33	11.83	11.66	11.20	11.10	11.85	11.72	11.29
7	12.25	12.09	11.63	11.67	11.90	11.72	11.23	11.06	11.80	11.75	11.26
7	12.21	12.04	11.66	11.54	11.91	11.66	11.16	11.01	11.88	11.72	11.25
9	12.20	11.97	11.37	11.27	11.82	11.60	11.29	10.87	11.74	11.61	11.12
5	12.10	11.97	11.32	11.28	11.84	11.57	11.20	10.98	11.77	11.56	11.13
5	12.18	12.07	11.33	11.47	11.75	11.46	11.00	10.88	11.70	11.60	11.08
5	12.19	12.03	11.46	11.45	11.81	11.60	11.18	10.96	11.78	11.65	11.17

roject NCM-18.

itted for Saturdays.

Table 27. (Continued)

Dates of survey[b]	Week and day	Area 1 180-200#	Area 1 200-220#	Area 1 220-240#	Area 1 240-270#	Area 2 180-200#	Area 2 200-220#	Area 2 220-240#	Area 2 240-270#
Feb. 15-20, 1960	Week 5								
	Mon.	13.68	13.84	13.92	13.62	12.56	13.16	12.97	12.63
	Tues.	13.62	13.83	13.77	13.44	12.55	13.17	12.96	12.62
	Wed.	13.72	13.90	13.86	13.54	12.75	13.07	12.88	12.53
	Thurs.	13.51	13.76	13.72	13.37	12.39	13.21	12.94	12.65
	Fri.	13.76	13.87	13.87	13.60	12.46	13.26	13.01	12.57
	Ave.	13.66	13.84	13.83	13.51	12.54	13.17	12.95	12.60
Feb. 22-27, 1960	Week 6								
	Mon.	13.93	14.10	14.19	14.00	13.08	13.39	13.11	12.87
	Tues.	13.72	14.02	13.97	13.66	12.81	13.32	13.15	12.82
	Wed.	13.96	14.18	14.15	13.88	13.06	13.39	13.32	12.91
	Thurs.	14.15	14.40	14.41	14.12	13.19	13.69	13.47	13.01
	Fri.	14.29	14.48	14.53	14.16	13.33	13.80	13.56	13.29
	Ave.	14.01	14.24	14.25	13.96	13.09	13.52	13.32	12.99

Area 1			Area 2				Area 3			
)-)#	220- 240#	240- 270#	180- 200#	200- 220#	220- 240#	240- 270#	180- 200#	200- 220#	220- 240#	240- 270#
84	13.92	13.62	12.56	13.16	12.97	12.63	12.73	13.12	12.91	12.52
83	13.77	13.44	12.55	13.17	12.96	12.62	12.66	13.16	12.93	12.45
90	13.86	13.54	12.75	13.07	12.88	12.53	12.61	13.03	12.81	12.43
76	13.72	13.37	12.39	13.21	12.94	12.65	12.77	13.14	12.94	12.54
87	13.87	13.60	12.46	13.26	13.01	12.57	12.67	13.12	12.96	12.44
84	13.83	13.51	12.54	13.17	12.95	12.60	12.69	13.12	12.91	12.48
10	14.19	14.00	13.08	13.39	13.11	12.87	12.97	13.32	13.05	12.72
02	13.97	13.66	12.81	13.32	13.15	12.82	12.75	13.35	13.16	12.69
18	14.15	13.88	13.06	13.39	13.32	12.91	12.49	13.38	13.19	12.80
40	14.41	14.12	13.19	13.69	13.47	13.01	13.33	13.62	13.33	12.93
48	14.53	14.16	13.33	13.80	13.56	13.29	12.89	13.65	13.49	12.95
24	14.25	13.96	13.09	13.52	13.32	12.99	12.89	13.46	13.24	12.82

Table 28. Average market prices, in dollars per 100 pounds, for a six-week period obtained from The Des Moines Tribune and the Des Moines Register

Dates of survey[a]	Week and day	Interior Iowa and Southern Minnesota				Sioux City			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Sept. 14-19, 1959	Week 1								
	Mon.	12.62	13.25	13.15	12.85	13.12	13.80	13.87	13.80
	Tues.	12.88	13.45	13.35	13.05	13.42	13.92	13.98	13.93
	Wed.	12.75	13.38	13.28	12.98	13.62	14.12	14.12	14.12
	Thurs.	12.75	13.38	13.28	12.92	13.38	13.80	13.80	13.80
	Fri.	12.75	13.38	13.22	12.88	13.55	13.88	13.88	13.75
	Ave.	12.75	13.37	13.26	12.94	13.42	13.90	13.93	13.88
Sept. 21-26, 1959	Week 2								
	Mon.	12.70	13.32	13.22	12.95	13.42	13.88	13.88	13.80
	Tues.	12.62	13.25	13.15	12.88	13.18	13.62	13.62	13.55
	Wed.	12.45	13.08	12.98	12.70	13.12	13.50	13.50	13.38
	Thurs.	12.50	13.12	13.02	12.75	13.25	13.55	13.55	13.55
	Fri.	12.32	13.20	13.25	12.82	13.38	13.88	13.92	13.80
	Ave.	12.52	13.19	13.12	12.82	13.27	13.69	13.69	13.62
Nov. 30-Dec. 5, 1959	Week 3								
	Mon.	11.32	11.88	11.65	11.28	12.00	12.12	12.12	11.88
	Tues.	11.32	11.88	11.65	11.28	12.00	12.20	12.12	11.88
	Wed.	11.58	12.12	11.90	11.50	12.12	12.38	12.38	12.00
	Thurs.	11.32	11.88	11.65	11.25	12.00	12.12	12.12	11.68
	Fri.	11.25	11.82	11.60	11.10	12.00	12.12	12.12	11.68
	Ave.	11.36	11.92	11.69	11.28	12.02	12.19	12.17	11.82

[a]Price data were omitted for Saturdays.

Table 28. (Continued)

Dates of survey[a]	Week and day	Interior Iowa and Southern Minnesota 180-200#	200-220#	220-240#	240-270#	Sioux City 180-200#	200-220#	220-240#	240-270#
Dec. 7-12, 1959	Week 4								
	Mon.	11.38	11.92	11.70	11.28	12.05	12.38	12.25	11.88
	Tues.	11.32	11.88	11.65	11.22	12.00	12.18	12.18	11.82
	Wed.	11.25	11.82	11.58	11.10	12.12	12.18	12.05	11.62
	Thurs.	11.20	11.75	11.50	10.98	12.00	12.12	12.12	11.62
	Fri.	11.20	11.68	11.45	10.88	12.00	12.12	12.05	11.62
	Ave.	11.27	11.81	11.58	11.09	12.03	12.20	12.13	11.71
Feb. 15-20, 1960	Week 5								
	Mon.	12.62	13.12	12.92	12.60	13.62	14.12	14.12	13.75
	Tues.	12.68	13.18	13.02	12.62	13.50	13.88	13.88	13.42
	Wed.	12.62	13.08	12.88	12.48	13.50	14.12	14.12	13.88
	Thurs.	12.55	13.12	12.92	12.52	13.25	13.88	13.88	13.50
	Fri.	12.60	13.12	12.98	12.55	13.62	14.12	14.12	13.75
	Ave.	12.61	13.12	12.94	12.55	13.50	14.02	14.02	13.66
Feb. 22-27, 1960	Week 6								
	Mon.	12.92	13.38	13.22	13.82	14.00	14.42	14.42	13.75
	Tues.	13.18	13.62	13.40	13.02	14.12	14.62	--	14.25
	Wed.	12.92	13.38	13.22	12.85	14.00	14.38	14.50	14.25
	Thurs.	12.80	13.32	13.15	12.78	13.75	14.12	14.05	13.88
	Fri.	13.18	13.75	14.52	12.90	14.25	14.88	14.88	14.68
	Ave.	13.00	13.49	13.30	12.87	14.02	14.48	14.46	14.16

Table 29. Average daily market price, in dollars per 100 pounds, for slaugh Interior Iowa and Southern Minnesota, Sioux City, and Chicago, as Tribune and The Des Moines Register for the period December 29, :

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
1958									
Dec.	29	17.32	17.88	17.42	16.68	18.75	18.62	18.38	17.28
	30	16.82	17.38	16.95	16.18	17.88	17.75	17.62	16.75
	31	16.75	17.32	16.90	16.12	17.62	17.25	16.50	16.00
1959									
Jan.	1	Holiday	--	--	--	--	--	--	--
	2	16.38	16.95	16.50	15.75	17.50	17.50	17.18	16.50
	Ave.	16.82	17.38	16.94	16.18	17.94	17.78	17.42	16.66
	5	--	--	--	--	18.38	18.25	17.88	17.25
	6	16.95	17.50	17.08	16.25	18.25	18.12	17.85	17.12
	7	16.70	17.25	16.82	16.00	18.00	17.88	17.38	16.62
	8	16.58	17.12	16.68	15.80	17.75	17.62	17.12	16.38
	9	16.70	17.25	16.82	16.00	--	17.75	17.38	16.62
	Ave.	16.73	17.28	16.85	16.01	18.10	17.92	17.52	16.80
	12	16.25	16.80	16.40	15.60	--	17.18	16.88	16.38
	13	16.32	16.88	16.45	15.70	--	17.32	17.05	16.48
	14	16.45	17.00	16.58	15.88	--	17.62	17.45	16.92
	15	16.32	16.88	16.45	15.68	--	17.25	17.08	16.58
	16	16.32	16.88	16.45	15.62	--	17.05	16.88	16.38
	Ave.	16.33	16.89	16.47	15.70	--	17.28	17.07	16.55
	19	16.58	17.12	16.70	15.88	--	17.62	17.45	17.00
	20	16.12	16.62	16.20	15.42	--	17.32	17.05	16.70
	21	16.38	16.95	16.52	15.75	--	17.55	17.40	16.92
	22	16.38	16.88	16.45	15.75	--	18.00	17.75	17.00
	23	16.08	16.62	16.20	15.50	--	17.25	16.88	16.38
	Ave.	16.31	16.84	16.41	15.66	--	17.55	17.31	16.80
	26	16.12	16.62	16.25	15.62	--	17.00	16.62	16.12
	27	15.82	16.32	15.95	15.32	17.12	17.05	16.75	16.32
	28	15.50	16.08	15.70	15.08	16.75	16.75	16.50	16.00
	29	15.50	16.00	15.62	15.00	16.25	16.25	16.05	15.62
	30	15.50	16.08	15.70	15.08	16.75	16.75	16.50	16.05
	Ave.	15.69	16.22	15.84	15.22	16.72	16.76	16.48	16.02

arket price, in dollars per 100 pounds, for slaughter hogs by weight classes, nd Southern Minnesota, Sioux City, and Chicago, as compiled by The Des Moines Des Moines Register for the period December 29, 1958, to February 26, 1960

erior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
17.42	16.68	18.75	18.62	18.38	17.28	18.25	18.25	18.12	17.75
16.95	16.18	17.88	17.75	17.62	16.75	17.62	17.75	17.62	17.25
16.90	16.12	17.62	17.25	16.50	16.00	17.38	17.88	17.25	16.62
--	--	--	--	--	--	--	--	--	--
16.50	15.75	17.50	17.50	17.18	16.50	16.62	16.62	16.50	15.88
16.94	16.18	17.94	17.78	17.42	16.66	17.47	17.62	17.37	16.88
--	--	18.38	18.25	17.88	17.25	17.88	17.88	17.62	17.12
17.08	16.25	18.25	18.12	17.85	17.12	17.88	17.88	17.70	17.38
16.82	16.00	18.00	17.88	17.38	16.62	17.62	17.62	17.62	17.00
16.68	15.80	17.75	17.62	17.12	16.38	17.38	17.38	17.38	17.00
16.82	16.00	--	17.75	17.38	16.62	17.62	17.62	17.50	17.12
16.85	16.01	18.10	17.92	17.52	16.80	17.68	17.68	17.56	17.12
16.40	15.60	--	17.18	16.88	16.38	17.00	17.00	16.88	16.50
16.45	15.70	--	17.32	17.05	16.48	17.12	17.12	17.00	16.50
16.58	15.88	--	17.62	17.45	16.92	17.18	17.18	17.05	16.50
16.45	15.68	--	17.25	17.08	16.58	16.88	16.88	16.75	16.38
16.45	15.62	--	17.05	16.88	16.38	17.00	17.00	16.88	16.50
16.47	15.70	--	17.28	17.07	16.55	17.04	17.04	16.91	16.48
16.70	15.88	--	17.62	17.45	17.00	17.62	17.62	17.50	16.88
16.20	15.42	--	17.32	17.05	16.70	17.00	17.00	17.00	16.62
16.52	15.75	--	17.55	17.40	16.92	17.62	17.62	17.50	17.00
16.45	15.75	--	18.00	17.75	17.00	17.62	17.62	17.50	--
16.20	15.50	--	17.25	16.88	16.38	--	16.62	16.50	16.12
16.41	15.66	--	17.55	17.31	16.80	17.46	17.30	17.20	16.66
16.25	15.62	--	17.00	16.62	16.12	16.62	16.62	16.62	16.38
15.95	15.32	17.12	17.05	16.75	16.32	16.68	16.68	16.68	16.12
15.70	15.08	16.75	16.75	16.50	16.00	16.50	16.50	16.50	16.12
15.62	15.00	16.25	16.25	16.05	15.62	16.62	16.62	16.50	16.12
15.70	15.08	16.75	16.75	16.50	16.05	16.88	16.88	16.75	16.38
15.84	15.22	16.72	16.76	16.48	16.02	16.66	16.66	16.61	16.22

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Feb.	2	15.58	15.82	15.70	15.58	16.75	16.75	16.55	16.25
	3	15.58	16.08	15.70	15.08	17.00	16.95	16.68	16.25
	4	15.58	16.08	15.70	15.08	16.75	16.75	16.50	16.00
	5	15.32	15.88	15.50	14.88	16.25	16.25	16.00	15.62
	6	15.42	15.92	15.55	14.92	16.50	16.50	16.25	15.75
	Ave.	15.50	15.96	15.63	15.11	16.65	16.64	16.40	15.97
	9	15.38	15.88	15.50	14.88	15.92	16.42	16.20	15.95
	10	15.50	16.00	15.62	15.00	16.75	16.82	16.60	16.15
	11	15.45	15.95	15.58	14.95	16.75	16.75	16.55	16.08
	12	15.08	15.58	15.20	14.58	16.25	16.25	16.00	15.75
	13	14.88	15.38	15.08	14.58	16.08	16.20	15.95	15.55
	Ave.	15.26	15.76	15.40	14.80	16.35	16.49	16.26	15.90
	16	14.88	15.38	15.08	14.58	15.88	16.12	15.95	15.62
	17	14.80	15.30	15.00	14.50	15.62	15.88	15.70	15.38
	18	14.62	15.12	14.82	14.32	15.62	15.62	15.70	15.38
	19	14.62	15.12	14.82	14.32	15.38	15.58	15.45	15.18
	20	14.62	15.12	14.82	14.32	15.62	15.82	15.68	15.38
	Ave.	14.71	15.21	14.91	14.41	15.62	15.80	15.70	15.39
	23	14.62	15.12	14.82	14.32	15.50	15.70	15.55	15.18
	24	14.42	14.88	14.65	14.28	15.38	15.58	15.40	15.12
	25	14.38	14.88	14.65	14.28	15.20	15.40	15.12	14.92
	26	14.62	15.12	14.90	14.40	15.38	15.58	15.45	15.20
	27	14.62	15.12	14.98	14.68	15.62	15.88	15.75	15.50
	Ave.	14.53	15.02	14.80	14.39	15.42	15.63	15.45	15.18
Mar.	2	14.62	15.12	14.98	14.70	15.88	16.12	15.88	15.62
	3	14.58	15.08	14.92	14.58	15.62	15.88	15.82	15.72
	4	14.62	15.12	14.82	14.68	15.45	15.78	15.62	15.50
	5	14.82	15.32	14.18	14.85	15.75	16.08	15.92	15.72
	6	14.88	15.38	15.25	14.90	16.05	16.48	16.38	16.18
	Ave.	14.70	15.20	15.03	14.74	15.75	16.07	15.92	15.75

erior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
15.70	15.58	16.75	16.75	16.55	16.25	16.50	16.50	16.50	16.12
15.70	15.08	17.00	16.95	16.68	16.25	16.50	16.50	16.50	16.25
15.70	15.08	16.75	16.75	16.50	16.00	16.62	16.62	16.50	16.12
15.50	14.88	16.25	16.25	16.00	15.62	16.38	16.38	16.25	16.38
15.55	14.92	16.50	16.50	16.25	15.75	16.38	16.38	16.38	15.88
15.63	15.11	16.65	16.64	16.40	15.97	16.48	16.48	16.43	16.15
15.50	14.88	15.92	16.42	16.20	15.95	16.38	16.38	16.25	16.00
15.62	15.00	16.75	16.82	16.60	16.15	16.62	16.62	16.62	16.25
15.58	14.95	16.75	16.75	16.55	16.08	16.62	16.62	16.50	16.25
15.20	14.58	16.25	16.25	16.00	15.75	16.50	16.50	16.50	15.88
15.08	14.58	16.08	16.20	15.95	15.55	16.12	16.12	16.00	15.88
15.40	14.80	16.35	16.49	16.26	15.90	16.45	16.45	16.37	16.05
15.08	14.58	15.88	16.12	15.95	15.62	16.12	16.12	15.88	15.62
15.00	14.50	15.62	15.88	15.70	15.38	15.75	15.88	15.75	15.50
14.82	14.32	15.62	15.62	15.70	15.38	15.75	15.88	15.50	15.38
14.82	14.32	15.38	15.58	15.45	15.18	15.62	15.62	15.62	--
14.82	14.32	15.62	15.82	15.68	15.38	15.62	15.62	15.62	15.30
14.91	14.41	15.62	15.80	15.70	15.39	15.77	15.82	15.68	15.45
14.82	14.32	15.50	15.70	15.55	15.18	15.75	15.38	15.75	15.38
14.65	14.28	15.38	15.58	15.40	15.12	15.62	15.62	15.62	15.25
14.65	14.28	15.20	15.40	15.12	14.92	15.50	15.50	15.50	15.25
14.90	14.40	15.38	15.58	15.45	15.20	15.62	15.62	15.62	15.25
14.98	14.68	15.62	15.88	15.75	15.50	15.88	15.88	15.75	15.50
14.80	14.39	15.42	15.63	15.45	15.18	15.67	15.60	15.65	15.33
14.98	14.70	15.88	16.12	15.88	15.62	15.75	15.88	15.75	15.30
14.92	14.58	15.62	15.88	15.82	15.72	15.88	16.00	15.88	15.38
14.82	14.68	15.45	15.78	15.62	15.50	15.62	15.62	15.62	15.25
14.18	14.85	15.75	16.08	15.92	15.72	15.88	15.88	15.88	15.62
15.25	14.90	16.05	16.48	16.38	16.18	16.25	16.25	16.25	15.88
15.03	14.74	15.75	16.07	15.92	15.75	15.88	15.93	15.88	15.49

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Mar.	9	14.62	15.12	14.98	14.62	15.75	16.18	16.02	15.82
	10	14.62	15.12	14.98	14.70	15.80	16.22	16.12	15.88
	11	14.88	15.38	15.22	14.95	16.00	16.42	16.32	16.05
	12	15.12	15.62	15.48	15.18	16.32	16.50	16.42	16.20
	13	14.88	15.38	15.25	14.92	16.08	16.32	16.25	16.05
	Ave.	14.82	15.32	15.18	14.87	15.99	16.33	16.23	16.00
	16	15.30	15.80	15.60	15.35	16.62	16.88	16.75	16.55
	17	15.05	15.55	15.35	15.10	16.32	16.58	16.48	15.68
	18	14.82	15.32	15.15	14.88	16.12	16.42	16.32	16.05
	19	14.88	15.38	15.20	14.92	16.00	16.38	16.22	16.00
	20	14.88	15.38	15.20	14.95	16.20	16.32	16.48	16.22
	Ave.	14.99	15.49	15.30	15.04	16.25	16.52	16.45	16.10
	23	14.80	15.30	15.12	14.88	15.95	16.32	15.98	15.75
	24	14.95	15.45	15.28	15.00	16.38	16.68	16.55	16.25
	25	15.32	15.82	15.65	15.38	16.62	16.82	16.58	16.45
	26	15.58	15.58	15.88	15.62	16.62	16.92	16.88	16.75
	27	15.62	16.12	15.95	15.68	16.88	17.30	17.18	17.00
	Ave.	15.25	15.65	15.58	15.31	16.49	16.81	16.63	16.44
	30	15.55	16.05	15.88	15.62	16.95	17.38	17.28	17.08
	31	15.38	15.88	15.70	15.45	16.50	16.82	16.68	16.45
Apr.	1	15.58	16.08	15.88	15.62	16.12	16.62	16.50	16.25
	2	15.58	16.08	15.88	15.62	16.30	16.75	16.55	16.25
	3	15.32	15.82	15.62	15.38	16.05	16.42	16.30	16.08
	Ave.	15.48	15.98	15.79	15.54	16.38	16.80	16.66	16.42
	6	15.08	15.58	15.38	15.10	15.95	16.32	16.20	16.00
	7	15.45	15.95	15.78	15.50	16.30	16.75	16.68	16.42
	8	15.58	16.08	15.90	15.62	16.58	17.08	16.98	16.70
	9	15.38	15.88	15.68	15.42	16.08	16.58	16.45	16.18
	10	15.38	15.88	15.70	15.48	16.20	16.62	16.50	16.25
	Ave.	15.37	13.87	15.69	15.42	16.22	16.67	16.56	16.31

rior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
14.98	14.62	15.75	16.18	16.02	15.82	15.62	15.62	15.62	15.25
14.98	14.70	15.80	16.22	16.12	15.88	15.88	15.88	15.88	15.50
15.22	14.95	16.00	16.42	16.32	16.05	16.38	16.38	16.25	16.12
15.48	15.18	16.32	16.50	16.42	16.20	16.38	16.62	16.55	16.20
15.25	14.92	16.08	16.32	16.25	16.05	16.38	16.38	16.25	15.88
15.18	14.87	15.99	16.33	16.23	16.00	16.13	16.18	16.11	15.79
15.60	15.35	16.62	16.88	16.75	16.55	16.88	16.88	16.88	16.50
15.35	15.10	16.32	16.58	16.48	15.68	16.38	16.38	16.25	16.00
15.15	14.88	16.12	16.42	16.32	16.05	16.12	16.12	16.00	15.62
15.20	14.92	16.00	16.38	16.22	16.00	15.88	15.88	15.88	15.50
15.20	14.95	16.20	16.32	16.48	16.22	16.12	16.12	16.12	15.80
15.30	15.04	16.25	16.52	16.45	16.10	16.28	16.28	16.23	15.88
15.12	14.88	15.95	16.32	15.98	15.75	16.00	15.92	15.88	15.75
15.28	15.00	16.38	16.68	16.55	16.25	16.18	16.22	16.22	16.00
15.65	15.38	16.62	16.82	16.58	16.45	16.50	16.05	16.50	16.05
15.88	15.62	16.62	16.92	16.88	16.75	16.88	17.12	17.00	16.62
15.95	15.68	16.88	17.30	17.18	17.00	16.88	16.88	16.88	16.30
15.58	15.31	16.49	16.81	16.63	16.44	16.49	16.44	16.50	16.14
15.88	15.62	16.95	17.38	17.28	17.08	16.88	16.88	16.88	16.38
15.70	15.45	16.50	16.82	16.68	16.45	16.50	16.62	16.50	16.12
15.88	15.62	16.12	16.62	16.50	16.25	16.62	16.62	16.62	16.25
15.88	15.62	16.30	16.75	16.55	16.25	16.75	16.75	16.75	16.25
15.62	15.38	16.05	16.42	16.30	16.08	16.62	16.62	16.50	15.92
15.79	15.54	16.38	16.80	16.66	16.42	16.67	16.70	16.65	16.18
15.38	15.10	15.95	16.32	16.20	16.00	15.88	15.92	15.88	15.75
15.78	15.50	16.30	16.75	16.68	16.42	16.68	16.68	16.62	16.25
15.90	15.62	16.58	17.08	16.98	16.70	16.50	16.50	16.50	15.75
15.68	15.42	16.08	16.58	16.45	16.18	16.68	16.68	16.62	16.00
15.70	15.48	16.20	16.62	16.50	16.25	16.62	16.62	16.62	16.12
15.69	15.42	16.22	16.67	16.56	16.31	16.47	16.48	16.45	15.97

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Apr.	13	15.42	15.92	15.72	15.50	16.25	16.62	16.58	16.38
	14	15.42	15.92	15.72	15.50	16.50	16.75	16.58	16.38
	15	15.38	15.88	15.68	15.45	16.50	16.82	16.65	16.38
	16	15.32	15.82	15.62	15.40	16.42	16.68	16.50	16.10
	17	15.12	15.62	15.42	15.20	16.62	16.88	16.70	16.40
	Ave.	15.33	15.83	15.63	15.41	16.42	16.75	16.60	16.33
	20	14.82	15.32	15.10	14.75	16.42	16.75	16.50	16.10
	21	14.88	15.38	15.15	14.78	16.25	16.62	16.38	15.95
	22	14.88	15.38	15.15	14.78	16.20	16.52	16.25	15.88
	23	15.32	15.82	15.60	15.22	16.45	16.82	16.62	16.25
	24	15.32	15.82	15.60	15.22	16.62	16.95	16.75	16.32
	Ave.	15.04	15.54	15.32	14.95	16.39	16.73	16.50	16.10
	27	15.12	15.62	15.40	15.02	16.42	16.75	16.50	16.12
	28	15.12	15.62	15.40	15.02	16.42	16.80	16.50	16.12
	29	15.12	15.62	15.40	15.02	16.42	16.68	16.45	15.95
	30	14.88	15.38	15.15	14.82	16.12	16.38	16.18	15.75
May	1	14.88	15.38	15.18	14.80	16.30	16.68	16.42	15.88
	Ave.	15.02	15.52	15.31	14.94	16.34	16.66	16.41	15.95
	4	15.12	15.62	15.40	15.02	16.50	16.88	16.58	16.10
	5	15.08	15.58	15.35	14.98	16.68	17.00	16.68	16.25
	6	14.88	15.38	15.15	14.78	16.62	16.88	16.62	16.12
	7	14.88	15.38	15.15	14.78	16.55	16.80	16.55	15.95
	8	14.88	15.38	15.15	14.78	16.55	16.88	16.50	15.88
	Ave.	14.97	15.47	15.24	14.87	16.58	16.89	16.59	16.06
	11	15.12	15.62	15.40	15.02	16.50	16.82	16.42	15.88
	12	14.88	15.38	15.15	14.78	16.20	16.52	16.12	15.62
	13	15.20	15.70	15.48	14.90	16.42	16.75	16.38	15.88
	14	15.58	16.08	15.85	15.50	16.68	16.98	16.68	16.12
	15	15.58	16.08	15.85	15.45	16.68	16.98	16.70	16.18
	Ave.	15.27	15.77	15.55	15.13	16.50	16.81	16.46	15.94

ior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
15.72	15.50	16.25	16.62	16.58	16.38	16.62	16.62	16.62	16.00
15.72	15.50	16.50	16.75	16.58	16.38	16.42	16.42	16.42	15.88
15.68	15.45	16.50	16.82	16.65	16.38	16.50	16.62	16.55	16.25
15.62	15.40	16.42	16.68	16.50	16.10	16.25	16.38	16.38	16.05
15.42	15.20	16.62	16.88	16.70	16.40	16.25	16.38	16.38	16.05
15.63	15.41	16.42	16.75	16.60	16.33	16.41	16.48	16.47	16.05
15.10	14.75	16.42	16.75	16.50	16.10	16.30	16.62	16.48	16.05
15.15	14.78	16.25	16.62	16.38	15.95	16.38	16.38	16.38	16.00
15.15	14.78	16.20	16.52	16.25	15.88	16.10	16.25	16.18	15.75
15.60	15.22	16.45	16.82	16.62	16.25	16.10	--	--	15.75
15.60	15.22	16.62	16.95	16.75	16.32	16.48	16.48	16.42	16.00
15.32	14.95	16.39	16.73	16.50	16.10	16.27	16.41	16.36	15.91
15.40	15.02	16.42	16.75	16.50	16.12	16.18	16.18	16.12	15.50
15.40	15.02	16.42	16.80	16.50	16.12	16.38	16.38	16.38	16.00
15.40	15.02	16.42	16.68	16.45	15.95	16.38	16.42	16.18	15.92
15.15	14.82	16.12	16.38	16.18	15.75	16.18	16.18	16.18	15.62
15.18	14.80	16.30	16.68	16.42	15.88	16.12	16.12	16.12	15.62
15.31	14.94	16.34	16.66	16.41	15.95	16.25	16.26	16.24	15.73
15.40	15.02	16.50	16.88	16.58	16.10	16.12	16.18	16.18	15.75
15.35	14.98	16.68	17.00	16.68	16.25	16.12	16.12	16.12	15.75
15.15	14.78	16.62	16.88	16.62	16.12	16.12	16.12	16.12	15.62
15.15	14.78	16.55	16.80	16.55	15.95	16.18	16.18	16.12	15.62
15.15	14.78	16.55	16.88	16.50	15.88	16.00	16.00	16.00	15.50
15.24	14.87	16.58	16.89	16.59	16.06	16.11	16.12	16.11	15.65
15.40	15.02	16.50	16.82	16.42	15.88	16.12	16.22	16.22	15.50
15.15	14.78	16.20	16.52	16.12	15.62	15.75	15.75	15.75	15.12
15.48	14.90	16.42	16.75	16.38	15.88	16.12	16.12	16.12	15.50
15.85	15.50	16.68	16.98	16.68	16.12	16.80	16.88	16.50	16.12
15.85	15.45	16.68	16.98	16.70	16.18	16.75	16.88	16.50	16.00
15.55	15.13	16.50	16.81	16.46	15.94	16.31	16.37	16.22	15.65

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
May	18	15.58	16.08	15.85	15.48	16.88	17.18	16.95	16.42
	19	15.62	16.12	15.90	15.58	16.88	17.18	16.95	16.42
	20	15.38	13.88	15.65	15.28	17.12	17.32	17.08	16.60
	21	15.25	15.75	15.52	15.15	16.70	16.95	16.75	16.20
	22	15.38	15.88	15.65	15.28	16.50	16.80	16.42	15.88
	Ave.	15.44	15.94	15.71	15.35	16.82	17.09	16.83	16.30
	25	15.38	15.88	15.65	15.28	16.70	17.08	16.68	16.10
	26	15.58	16.08	15.35	15.45	16.75	17.12	16.82	16.25
	27	15.62	16.12	15.92	15.52	16.50	16.88	16.62	16.05
	28	15.58	16.08	15.85	15.45	16.38	16.62	16.50	16.00
	29	15.58	16.08	15.85	15.45	17.00	17.25	17.00	16.50
	Ave.	15.55	16.05	15.72	15.42	16.67	16.99	16.72	16.18
June	1	15.62	16.12	15.90	15.52	16.95	17.20	16.95	16.40
	2	15.38	15.88	15.65	15.28	16.70	16.95	16.75	16.32
	3	15.62	16.12	15.90	15.52	16.75	17.08	16.82	16.32
	4	15.62	16.12	15.90	15.52	16.75	17.12	16.95	16.55
	5	15.58	16.08	15.85	15.45	16.55	16.92	16.80	16.50
	Ave.	15.56	16.06	15.84	15.46	16.74	17.05	16.85	16.42
	8	15.50	16.00	15.72	15.30	16.55	16.92	16.70	16.25
	9	15.55	16.05	15.82	15.45	16.75	17.08	16.82	16.25
	10	15.38	15.88	15.65	15.22	16.75	17.12	16.75	16.05
	11	15.20	15.70	15.48	15.08	16.50	16.70	16.42	15.75
	12	15.08	15.58	15.35	14.95	16.20	16.32	16.12	15.50
	Ave.	15.34	15.84	15.60	15.20	16.55	16.83	16.56	15.96
	15	15.12	15.62	15.40	14.98	16.42	16.68	16.45	15.95
	16	15.12	15.62	15.62	15.00	16.62	16.88	16.88	16.12
	17	15.42	15.92	15.70	15.30	16.88	17.12	16.92	16.48
	18	15.25	15.75	15.65	15.18	17.05	17.18	17.05	16.55
	19	15.00	15.50	15.40	14.78	17.05	17.18	17.05	16.55
	Ave.	15.18	15.68	15.55	15.05	16.80	17.01	16.87	16.33

.or		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
15.85	15.48	16.88	17.18	16.95	16.42	16.75	16.88	16.75	16.12
15.90	15.58	16.88	17.18	16.95	16.42	16.75	16.92	16.75	16.25
15.65	15.28	17.12	17.32	17.08	16.60	16.88	17.00	17.00	15.40
15.52	15.15	16.70	16.95	16.75	16.20	16.62	16.62	16.50	15.75
15.65	15.28	16.50	16.80	16.42	15.88	16.50	16.50	16.62	15.88
15.71	15.35	16.82	17.09	16.83	16.30	16.70	16.78	16.72	15.88
15.65	15.28	16.70	17.08	16.68	16.10	16.12	16.12	16.12	15.62
15.35	15.45	16.75	17.12	16.82	16.25	16.38	16.38	16.38	16.00
15.92	15.52	16.50	16.88	16.62	16.05	16.38	16.38	16.38	16.05
15.85	15.45	16.38	16.62	16.50	16.00	16.38	16.38	16.38	16.00
15.85	15.45	17.00	17.25	17.00	16.50	16.88	16.88	16.88	16.38
15.72	15.42	16.67	16.99	16.72	16.18	16.43	16.43	16.43	16.01
15.90	15.52	16.95	17.20	16.95	16.40	16.62	16.62	16.62	16.25
15.65	15.28	16.70	16.95	16.75	16.32	16.25	16.25	16.25	15.75
15.90	15.52	16.75	17.08	16.82	16.32	16.25	16.38	16.38	15.88
15.90	15.52	16.75	17.12	16.95	16.55	16.38	16.38	16.38	16.12
15.85	15.45	16.55	16.92	16.80	16.50	16.12	16.18	16.18	15.75
15.84	15.46	16.74	17.05	16.85	16.42	16.32	16.36	16.36	15.95
15.72	15.30	16.55	16.92	16.70	16.25	16.12	16.12	16.12	15.75
15.82	15.45	16.75	17.08	16.82	16.25	16.38	16.38	16.38	16.00
15.65	15.22	16.75	17.12	16.75	16.05	16.38	16.38	16.38	15.88
15.48	15.08	16.50	16.70	16.42	15.75	16.25	16.38	16.38	15.88
15.35	14.95	16.20	16.32	16.12	15.50	16.12	16.12	16.12	16.12
15.60	15.20	16.55	16.83	16.56	15.96	16.25	16.28	16.28	15.93
15.40	14.98	16.42	16.68	16.45	15.95	16.38	16.38	--	15.75
15.62	15.00	16.62	16.88	16.88	16.12	16.25	16.38	--	15.88
15.70	15.30	16.88	17.12	16.92	16.48	16.25	16.38	16.38	15.88
15.65	15.18	17.05	17.18	17.05	16.55	--	16.38	16.25	15.75
15.40	14.78	17.05	17.18	17.05	16.55	16.00	16.12	16.12	15.62
15.55	15.05	16.80	17.01	16.87	16.33	16.22	16.35	16.25	15.78

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
June	22	15.12	15.62	15.40	14.85	16.70	16.95	16.68	16.18
	23	14.92	15.42	15.15	14.52	16.12	16.38	16.12	15.60
	24	15.12	15.62	15.32	14.70	16.25	16.62	16.32	15.75
	25	15.12	15.62	15.28	14.65	16.25	16.62	16.38	15.82
	26	14.82	15.32	14.98	14.32	16.20	16.50	16.18	15.62
	Ave.	15.02	15.52	15.23	14.61	16.30	16.61	16.34	15.79
	29	14.62	15.12	14.75	14.12	15.92	16.18	16.00	--
	30	14.12	14.68	14.30	13.62	15.50	15.82	15.70	--
July	1	14.12	14.62	14.28	13.62	15.50	15.82	15.70	--
	2	14.12	14.62	14.28	13.70	15.50	15.75	15.62	--
	3	14.25	14.75	14.40	13.82	15.50	15.75	15.62	--
	Ave.	14.25	14.76	14.40	13.78	15.58	15.86	15.73	--
	6	14.50	15.00	14.62	14.00	15.50	15.88	15.82	--
	7	14.30	14.80	14.45	13.80	15.30	15.75	15.68	--
	8	14.30	14.80	14.42	13.80	15.12	15.58	15.50	--
	9	14.08	14.58	14.20	13.58	14.75	15.25	15.12	--
	10	13.75	14.25	13.88	13.25	14.50	14.88	14.88	--
	Ave.	14.19	14.69	14.31	13.69	15.03	15.47	15.40	--
	13	13.62	14.12	13.75	13.12	14.12	14.38	14.38	--
	14	13.62	14.12	13.75	13.12	14.38	14.62	14.58	--
	15	13.55	13.98	13.68	13.05	14.38	14.68	14.55	--
	16	13.62	14.12	13.75	13.12	14.32	14.70	14.62	--
	17	13.38	13.88	13.50	12.88	14.32	14.70	14.58	--
	Ave.	13.56	14.04	13.69	13.06	14.30	14.62	14.54	--
	20	13.25	13.88	13.50	12.88	14.30	14.68	14.55	--
	21	13.25	13.88	13.50	12.88	13.88	14.25	14.12	--
	22	13.25	13.88	13.50	12.88	13.68	14.18	14.05	--
	23	13.25	13.88	13.50	12.88	13.62	14.12	14.00	--
	24	13.25	13.82	13.45	12.82	13.38	13.88	13.82	--
	Ave.	13.25	13.87	13.49	12.87	13.77	14.22	14.11	--

erior			Chicago				Sioux City			
	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
2	15.40	14.85	16.70	16.95	16.68	16.18	16.18	16.18	15.92	15.00
2	15.15	14.52	16.12	16.38	16.12	15.60	15.62	15.62	15.50	15.00
2	15.32	14.70	16.25	16.62	16.32	15.75	15.62	15.62	15.50	15.00
2	15.28	14.65	16.25	16.62	16.38	15.82	--	--	15.88	15.25
2	14.98	14.32	16.20	16.50	16.18	15.62	15.75	16.00	15.88	15.38
2	15.23	14.61	16.30	16.61	16.34	15.79	15.79	15.86	15.74	15.13
2	14.75	14.12	15.92	16.18	16.00	--	15.50	15.62	15.50	15.00
8	14.30	13.62	15.50	15.82	15.70	--	15.00	15.12	15.12	14.50
2	14.28	13.62	15.50	15.82	15.70	--	15.00	15.12	15.12	14.50
2	14.28	13.70	15.50	15.75	15.62	--	14.88	15.12	15.00	14.25
5	14.40	13.82	15.50	15.75	15.62	--	15.25	15.38	15.25	14.75
6	14.40	13.78	15.58	15.86	15.73	--	15.13	15.27	15.20	14.60
0	14.62	14.00	15.50	15.88	15.82	--	15.25	15.38	15.38	14.88
0	14.45	13.80	15.30	15.75	15.68	--	15.25	--	--	14.88
0	14.42	13.80	15.12	15.58	15.50	--	15.25	15.50	15.50	15.00
3	14.20	13.58	14.75	15.25	15.12	--	15.25	15.38	15.38	14.75
5	13.88	13.25	14.50	14.88	14.88	--	14.88	15.00	15.00	14.25
9	14.31	13.69	15.03	15.47	15.40	--	15.18	15.32	15.32	14.75
2	13.75	13.12	14.12	14.38	14.38	--	14.38	14.62	--	14.00
2	13.75	13.12	14.38	14.62	14.58	--	14.38	14.70	14.62	14.38
3	13.68	13.05	14.38	14.68	14.55	--	14.38	14.68	14.68	14.50
2	13.75	13.12	14.32	14.70	14.62	--	14.38	14.72	--	14.50
3	13.50	12.88	14.32	14.70	14.58	--	14.38	14.80	14.72	14.50
4	13.69	13.06	14.30	14.62	14.54	--	14.38	14.70	14.67	14.38
3	13.50	12.88	14.30	14.68	14.55	--	14.68	14.62	14.62	14.25
3	13.50	12.88	13.88	14.25	14.12	--	14.38	14.68	14.62	14.25
3	13.50	12.88	13.68	14.18	14.05	--	14.38	14.68	14.62	14.38
3	13.50	12.88	13.62	14.12	14.00	--	14.00	14.62	14.62	14.25
2	13.45	12.82	13.38	13.88	13.82	--	13.75	14.25	14.50	14.12
7	13.49	12.87	13.77	14.22	14.11	--	14.24	14.57	14.60	14.25

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
July	27	13.25	13.82	13.45	12.82	13.50	13.92	13.88	--
	28	13.25	14.00	13.62	13.00	13.75	14.12	14.12	--
	29	13.05	13.75	13.48	12.88	14.00	14.42	14.42	--
	30	13.00	13.75	13.42	12.78	14.08	14.58	14.58	--
	31	13.12	13.88	13.60	12.92	14.18	14.75	14.68	--
	Ave.	13.13	13.84	13.51	12.88	13.90	14.36	14.34	--
Aug.	3	13.12	13.88	13.65	13.02	14.38	14.88	14.82	--
	4	13.12	13.92	13.70	13.10	14.30	14.80	14.80	--
	5	13.12	13.92	13.70	13.10	13.95	14.50	14.50	--
	6	13.12	13.88	13.70	12.75	13.82	14.25	14.42	--
	7	13.12	13.92	13.70	13.12	13.78	14.45	14.62	--
	Ave.	13.12	13.90	13.69	13.02	14.05	14.58	14.63	--
	10	13.30	13.30	13.82	13.25	14.05	14.42	14.55	--
	11	13.30	14.05	13.85	13.30	14.08	14.52	14.58	--
	12	13.38	14.12	13.92	13.38	14.18	14.52	14.58	--
	13	13.55	14.30	14.10	13.55	14.25	14.68	14.75	--
	14	13.62	14.38	14.15	13.62	14.50	14.75	14.95	--
	Ave.	13.43	14.03	13.97	13.42	14.21	14.58	14.68	--
	17	13.75	14.38	14.18	13.62	14.92	15.25	15.25	--
	18	13.75	14.45	14.25	13.70	14.42	14.75	14.88	--
	19	13.92	14.62	14.42	13.82	14.55	14.80	14.88	--
	20	14.18	14.88	14.68	14.12	14.58	14.92	15.00	--
	21	14.18	14.88	14.68	14.12	14.88	15.18	15.25	--
	Ave.	13.96	14.64	14.44	13.88	14.67	14.98	15.05	--
	24	14.12	14.82	14.62	14.08	14.62	14.92	15.02	--
	25	13.75	14.50	14.30	13.75	14.42	14.72	14.88	--
	26	13.25	14.00	13.95	13.60	14.38	14.68	14.82	--
	27	13.00	13.75	13.75	13.32	14.12	14.45	14.62	--
	28	12.75	13.38	13.32	12.72	13.50	13.98	14.12	--
	Ave.	13.37	14.09	13.99	13.49	14.21	14.65	14.69	--

erior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
13.45	12.82	13.50	13.92	13.88	--	13.62	14.25	14.38	14.18
13.62	13.00	13.75	14.12	14.12	--	13.62	14.38	14.38	14.18
13.48	12.88	14.00	14.42	14.42	--	13.50	14.62	14.55	14.50
13.42	12.78	14.08	14.58	14.58	--	13.58	14.50	14.55	14.38
13.60	12.92	14.18	14.75	14.68	--	13.38	14.38	14.38	14.18
13.51	12.88	13.90	14.36	14.34	--	13.54	14.43	14.45	14.28
13.65	13.02	14.38	14.88	14.82	--	14.00	14.75	14.62	14.25
13.70	13.10	14.30	14.80	14.80	--	13.75	14.62	14.62	14.42
13.70	13.10	13.95	14.50	14.50	--	--	14.62	14.68	14.50
13.70	12.75	13.82	14.25	14.42	--	13.75	14.68	14.62	14.50
13.70	13.12	13.78	14.45	14.62	--	13.88	14.88	14.88	14.68
13.69	13.02	14.05	14.58	14.63	--	13.84	14.71	14.68	14.47
13.82	13.25	14.05	14.42	14.55	--	14.18	14.88	14.88	14.68
13.85	13.30	14.08	14.52	14.58	--	13.62	14.75	14.88	14.80
13.92	13.38	14.18	14.52	14.58	--	14.25	15.00	15.12	14.92
14.10	13.55	14.25	14.68	14.75	--	14.50	15.25	15.38	15.38
14.15	13.62	14.50	14.75	14.95	--	14.88	15.68	15.80	15.68
13.97	13.42	14.21	14.58	14.68	--	14.29	15.11	15.21	15.09
14.18	13.62	14.92	15.25	15.25	--	14.88	15.75	15.88	15.80
14.25	13.70	14.42	14.75	14.88	--	14.88	15.50	15.62	15.42
14.42	13.82	14.55	14.80	14.88	--	15.00	15.68	15.62	15.62
14.68	14.12	14.58	14.92	15.00	--	15.12	15.80	15.80	15.68
14.68	14.12	14.88	15.18	15.25	--	15.18	15.75	15.88	15.88
14.44	13.88	14.67	14.98	15.05	--	15.01	15.70	15.76	15.68
14.62	14.08	14.62	14.92	15.02	--	14.62	15.50	15.62	15.62
14.30	13.75	14.42	14.72	14.88	--	14.62	15.25	15.12	15.25
13.95	13.60	14.38	14.68	14.82	--	13.88	14.62	14.62	14.62
13.75	13.32	14.12	14.45	14.62	--	14.00	14.25	14.50	14.38
13.32	12.72	13.50	13.98	14.12	--	13.25	14.00	14.12	14.12
13.99	13.49	14.21	14.65	14.69	--	14.07	14.72	14.80	14.80

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Aug.	31	13.00	13.62	13.62	13.28	13.62	13.98	14.12	--
Sept.	1	13.70	13.82	13.72	13.30	14.00	14.45	14.28	--
	2	13.25	13.88	13.78	13.38	14.00	14.42	14.48	--
	3	13.25	13.88	13.78	13.38	13.70	14.08	14.18	--
	4	13.00	13.58	13.42	13.08	13.45	13.88	14.05	--
	Ave.	13.24	13.76	13.66	13.28	13.75	14.16	14.22	--
	7	Holiday	--	--	--	--	--	--	--
	8	13.00	13.58	13.42	12.90	13.62	13.92	14.05	--
	9	13.12	13.75	13.65	13.35	13.95	14.25	14.30	--
	10	13.08	13.68	13.60	13.30	13.95	14.32	14.38	--
	11	12.88	13.50	13.40	13.10	13.70	14.08	14.18	--
	Ave.	13.02	13.63	13.52	13.16	13.80	14.14	14.23	--
	14	12.62	13.25	13.15	12.85	13.38	13.62	13.68	--
	15	12.88	13.45	13.35	13.05	13.38	13.68	13.72	--
	16	12.75	13.38	13.28	12.98	13.55	13.75	13.87	--
	17	12.75	13.38	13.28	12.92	13.38	13.62	13.82	--
	18	12.75	13.38	13.22	12.88	13.55	13.72	13.82	--
	Ave.	12.75	13.37	13.26	12.94	13.45	13.68	13.78	--
	21	12.70	13.32	13.22	12.95	13.62	13.88	13.88	--
	22	12.62	13.25	13.15	12.88	13.80	13.98	13.98	--
	23	12.45	13.08	12.98	12.70	13.62	13.88	13.88	--
	24	12.50	13.12	13.02	12.75	13.55	13.80	13.80	--
	25	12.32	13.20	13.25	12.82	13.75	13.88	13.92	--
	Ave.	12.52	13.19	13.12	12.82	13.67	13.88	13.89	--
	28	12.45	13.08	12.98	12.70	13.50	13.62	13.70	--
	29	12.25	12.88	12.72	12.48	13.32	13.52	13.62	--
	30	11.95	12.58	12.42	12.18	12.92	13.18	13.25	--
Oct.	1	12.00	12.62	12.48	12.22	13.00	13.20	13.22	--
	2	12.25	12.82	12.72	12.48	13.00	13.20	13.20	--
	Ave.	12.18	12.80	12.66	12.41	13.15	13.34	13.40	--

ior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
13.62	13.28	13.62	13.98	14.12	--	13.88	14.25	14.38	14.38
13.72	13.30	14.00	14.45	14.28	--	14.25	14.62	14.62	14.62
13.78	13.38	14.00	14.42	14.48	--	14.30	14.68	14.72	14.62
13.78	13.38	13.70	14.08	14.18	--	13.88	14.25	14.38	14.38
13.42	13.08	13.45	13.88	14.05	--	13.12	13.92	13.98	13.98
13.66	13.28	13.75	14.16	14.22	--	13.89	14.34	14.42	14.40
--	--	--	--	--	--	--	--	--	--
13.42	12.90	13.62	13.92	14.05	--	13.25	13.87	13.87	13.87
13.65	13.35	13.95	14.25	14.30	--	13.75	14.50	14.55	14.50
13.60	13.30	13.95	14.32	14.38	--	13.50	14.12	14.12	14.12
13.40	13.10	13.70	14.08	14.18	--	13.50	14.12	14.12	14.12
13.52	13.16	13.80	14.14	14.23	--	13.50	14.15	14.16	14.15
13.15	12.85	13.38	13.62	13.68	--	13.12	13.80	13.87	13.80
13.35	13.05	13.38	13.68	13.72	--	13.42	13.92	13.98	13.93
13.28	12.98	13.55	13.75	13.87	--	13.62	14.12	14.12	14.12
13.28	12.92	13.38	13.62	13.82	--	13.38	13.80	13.80	13.80
13.22	12.88	13.55	13.72	13.82	--	13.55	13.88	13.88	13.75
13.26	12.94	13.45	13.68	13.78	--	13.42	13.90	13.93	13.88
13.22	12.95	13.62	13.88	13.88	--	13.42	13.88	13.88	13.80
13.15	12.88	13.80	13.98	13.98	--	13.18	13.62	13.62	13.55
12.98	12.70	13.62	13.88	13.88	--	13.12	13.50	13.50	13.38
13.02	12.75	13.55	13.80	13.80	--	13.25	13.55	13.55	12.55
13.25	12.82	13.75	13.88	13.92	--	13.38	13.88	13.92	13.80
13.12	12.82	13.67	13.88	13.89	--	13.27	13.69	13.69	13.62
12.98	12.70	13.50	13.62	13.70	--	13.12	13.58	13.58	13.58
12.72	12.48	13.32	13.52	13.62	--	13.00	13.30	13.30	13.18
12.42	12.18	12.92	13.18	13.25	--	12.88	13.12	13.12	13.12
12.48	12.22	13.00	13.20	13.22	--	13.00	13.20	13.20	13.20
12.72	12.48	13.00	13.20	13.20	--	13.12	13.18	13.18	13.12
12.66	12.41	13.15	13.34	13.40	--	13.02	13.28	13.28	13.24

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Oct.	5	12.25	12.82	12.72	12.48	13.10	13.20	13.20	--
	6	12.05	12.62	12.52	12.22	12.88	13.08	13.08	--
	7	12.05	12.62	12.48	12.22	12.58	12.95	12.95	--
	8	12.05	12.62	12.48	12.22	12.42	12.80	12.88	--
	9	12.00	12.08	12.48	12.22	12.38	12.70	12.82	--
	Ave.	12.08	12.55	12.54	12.27	12.67	12.95	12.99	--
	12	12.00	12.58	12.48	12.22	12.82	13.08	13.08	--
	13	12.00	12.88	12.48	12.22	12.68	13.00	13.05	--
	14	12.00	12.62	12.48	12.22	12.88	13.18	13.18	--
	15	12.05	12.70	12.60	12.32	12.68	13.00	13.05	--
	16	12.05	12.68	12.62	12.38	12.75	13.18	13.18	--
	Ave.	12.02	12.69	12.53	12.27	12.76	13.09	13.11	--
	19	12.05	12.68	12.52	12.30	12.62	12.92	12.92	--
	20	12.32	13.00	12.90	12.62	13.12	13.42	13.42	--
	21	12.50	13.08	12.98	12.72	13.40	13.72	13.68	--
	22	12.50	13.08	12.92	12.68	13.58	13.82	13.75	--
	23	12.05	12.62	12.48	12.22	13.32	13.00	13.45	--
	Ave.	12.28	12.89	12.76	12.51	13.21	13.38	13.44	--
	26	11.75	12.32	12.22	11.92	13.05	13.22	13.12	--
	27	11.80	12.38	12.22	11.95	12.75	12.82	12.75	--
	28	12.00	12.62	12.52	12.25	12.95	13.00	12.90	--
	29	12.25	12.88	12.72	12.48	13.05	13.18	13.12	--
	30	12.08	12.70	12.55	12.18	13.30	13.42	13.38	--
	Ave.	11.98	12.58	12.45	12.16	13.02	13.13	13.05	--
Nov.	2	11.72	12.38	12.12	11.98	11.72	13.45	12.95	--
	3	11.75	12.82	12.65	12.12	13.38	13.58	13.50	--
	4	11.88	12.50	12.35	12.10	13.18	13.50	13.60	--
	5	11.88	12.38	12.28	11.75	12.92	13.00	12.88	--
	6	12.00	12.50	12.40	12.12	12.92	13.00	12.82	--
	Ave.	11.85	12.52	12.36	12.01	13.02	13.31	13.15	--

ior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
12.72	12.48	13.10	13.20	13.20	--	13.12	13.18	13.18	13.12
12.52	12.22	12.88	13.08	13.08	--	12.88	13.18	13.18	13.18
12.48	12.22	12.58	12.95	12.95	--	13.00	13.18	13.18	13.18
12.48	12.22	12.42	12.80	12.88	--	12.95	13.12	13.12	13.08
12.48	12.22	12.38	12.70	12.82	--	13.00	13.20	13.20	13.18
12.54	12.27	12.67	12.95	12.99	--	12.99	13.17	13.17	13.15
12.48	12.22	12.82	13.08	13.08	--	12.88	13.12	13.12	13.12
12.48	12.22	12.68	13.00	13.05	--	12.92	13.18	13.18	13.18
12.48	12.22	12.88	13.18	13.18	--	13.00	13.18	13.18	13.12
12.60	12.32	12.68	13.00	13.05	--	12.95	13.12	13.12	13.08
12.62	12.38	12.75	13.18	13.18	--	12.88	13.30	13.30	13.25
12.53	12.27	12.76	13.09	13.11	--	12.93	13.18	13.18	13.15
12.52	12.30	12.62	12.92	12.92	--	12.75	13.00	13.00	12.92
12.90	12.62	13.12	13.42	13.42	--	13.12	13.42	13.42	13.38
12.98	12.72	13.40	13.72	13.68	--	13.25	13.58	13.58	13.55
12.92	12.68	13.58	13.82	13.75	--	--	13.55	13.55	13.55
12.48	12.22	13.32	13.00	13.45	--	12.80	13.12	13.05	12.92
12.76	12.51	13.21	13.38	13.44	--	12.98	13.33	13.32	13.26
12.22	11.92	13.05	13.22	13.12	--	--	13.05	13.05	13.05
12.22	11.95	12.75	12.82	12.75	--	--	12.88	12.88	12.75
12.52	12.25	12.95	13.00	12.90	--	--	13.22	13.22	13.08
12.72	12.48	13.05	13.18	13.12	--	--	13.18	13.18	13.18
12.55	12.18	13.30	13.42	13.38	--	--	12.92	12.92	12.88
12.45	12.16	13.02	13.13	13.05	--	--	13.05	13.05	12.99
12.12	11.98	11.72	13.45	12.95	--	--	12.38	12.38	12.12
12.65	12.12	13.38	13.58	13.50	--	--	13.08	13.08	13.05
12.35	12.10	13.18	13.50	13.60	--	--	12.92	12.92	12.80
12.28	11.75	12.92	13.00	12.88	--	--	12.88	12.88	12.68
12.40	12.12	12.92	13.00	12.82	--	--	13.00	13.00	13.00
12.36	12.01	13.02	13.31	13.15	--	--	12.85	12.85	12.73

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Nov.	9	11.75	13.32	12.10	11.72	13.12	13.18	13.05	--
	10	12.05	12.32	12.13	11.72	13.20	13.25	13.08	--
	11	11.75	12.25	12.10	11.72	13.00	13.55	13.25	--
	12	11.78	12.38	12.15	11.78	13.00	13.12	12.88	--
	13	11.75	12.25	12.08	11.72	12.92	12.98	12.75	--
	Ave.	11.82	12.30	12.11	11.73	13.05	13.22	13.00	--
	16	11.52	12.05	11.85	11.42	12.68	12.75	12.58	--
	17	11.50	12.08	11.85	11.48	12.62	12.70	12.50	--
	18	11.50	12.02	11.80	11.42	12.88	13.08	12.82	--
	19	11.50	12.08	11.85	11.48	12.55	12.68	12.50	--
	20	11.62	12.20	11.98	11.55	12.68	12.88	12.70	--
	Ave.	11.53	12.09	11.87	11.47	12.68	12.82	12.62	--
	23	11.80	12.38	11.85	11.78	12.95	13.20	12.98	--
	24	11.32	11.88	11.65	11.28	12.62	12.82	12.62	--
	25	11.50	12.08	11.85	11.50	12.68	12.92	12.62	--
	26	Holiday	--	--	--	--	--	--	--
	27	11.75	12.32	12.10	11.72	12.88	13.05	12.80	--
	Ave.	11.59	12.16	11.86	11.57	12.78	13.00	12.76	--
	30	11.32	11.88	11.65	11.28	12.55	12.68	12.42	--
Dec.	1	11.32	11.88	11.65	11.28	12.32	12.52	12.25	11.92
	2	11.58	12.12	11.90	11.50	12.55	12.75	12.42	12.12
	3	11.32	11.88	11.65	11.25	12.50	12.62	12.32	12.02
	4	11.25	11.82	11.60	11.10	12.32	12.42	12.20	11.82
	Ave.	11.36	11.92	11.69	11.28	12.45	12.60	12.32	11.97
	7	11.38	11.92	11.70	11.28	12.75	12.88	12.60	12.20
	8	11.32	11.88	11.65	11.22	12.62	12.82	12.38	11.95
	9	11.25	11.82	11.58	11.10	12.32	12.45	12.18	11.68
	10	11.20	11.75	11.50	10.98	12.32	12.45	12.00	11.50
	11	11.20	11.68	11.45	10.88	12.12	12.38	11.92	11.38
	Ave.	11.27	11.81	11.58	11.09	12.43	12.60	12.22	11.74

or		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
12.10	11.72	13.12	13.18	13.05	--	12.50	12.88	12.75	12.62
12.13	11.72	13.20	13.25	13.08	--	12.38	12.42	12.48	12.30
12.10	11.72	13.00	13.55	13.25	--	12.38	12.48	12.48	12.25
12.15	11.78	13.00	13.12	12.88	--	12.62	12.88	12.88	12.75
12.08	11.72	12.92	12.98	12.75	--	12.25	12.42	12.42	12.25
12.11	11.73	13.05	13.22	13.00	--	12.43	12.62	12.60	12.43
11.85	11.42	12.68	12.75	12.58	--	12.00	12.30	12.30	12.18
11.85	11.48	12.62	12.70	12.50	--	12.12	12.30	12.25	12.12
11.80	11.42	12.88	13.08	12.82	--	11.88	12.00	12.00	11.75
11.85	11.48	12.55	12.68	12.50	--	12.00	12.28	12.18	12.00
11.98	11.55	12.68	12.88	12.70	--	12.25	12.38	12.38	12.25
11.87	11.47	12.68	12.82	12.62	--	12.05	12.25	12.22	12.06
11.85	11.78	12.95	13.20	12.98	--	12.55	12.88	12.80	12.62
11.65	11.28	12.62	12.82	12.62	--	12.25	12.38	12.38	12.25
11.85	11.50	12.68	12.92	12.62	--	12.12	12.38	12.42	12.25
--	--	--	--	--	--	--	--	--	--
12.10	11.72	12.88	13.05	12.80	--	12.38	12.68	12.62	12.38
11.86	11.57	12.78	13.00	12.76	--	12.32	12.58	12.56	12.38
11.65	11.28	12.55	12.68	12.42	--	12.00	12.12	12.12	11.88
11.65	11.28	12.32	12.52	12.25	11.92	12.00	12.20	12.12	11.88
11.90	11.50	12.55	12.75	12.42	12.12	12.12	12.38	12.38	12.00
11.65	11.25	12.50	12.62	12.32	12.02	12.00	12.12	12.12	11.68
11.60	11.10	12.32	12.42	12.20	11.82	12.00	12.12	12.12	11.68
11.69	11.28	12.45	12.60	12.32	11.97	12.02	12.19	12.17	11.82
11.70	11.28	12.75	12.88	12.60	12.20	12.05	12.38	12.25	11.88
11.65	11.22	12.62	12.82	12.38	11.95	12.00	12.18	12.18	11.82
11.58	11.10	12.32	12.45	12.18	11.68	12.12	12.18	12.05	11.62
11.50	10.98	12.32	12.45	12.00	11.50	12.00	12.12	12.12	11.62
11.45	10.88	12.12	12.38	11.92	11.38	12.00	12.12	12.05	11.62
11.58	11.09	12.43	12.60	12.22	11.74	12.03	12.20	12.13	11.71

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Dec.	14	11.25	11.92	11.52	11.02	12.00	12.25	11.80	11.38
	15	11.00	11.58	11.35	10.82	12.18	12.42	11.92	11.50
	16	10.75	11.50	11.30	10.68	12.12	12.38	11.92	11.35
	17	10.98	11.42	11.15	10.55	12.00	12.25	11.88	11.25
	18	11.08	11.50	11.25	10.78	12.00	12.30	11.80	11.20
	Ave.	11.01	11.58	11.31	10.77	12.06	12.32	11.86	11.34
	21	11.20	11.62	11.40	10.82	12.12	12.38	11.92	11.38
	22	11.20	11.62	11.35	10.82	11.95	12.12	11.65	11.05
	23	11.20	11.62	11.35	10.85	11.95	12.12	11.70	11.05
	24	11.30	11.75	11.45	11.42	12.42	12.60	11.92	11.32
	25	Holiday	--	--	--	--	--	--	--
	Ave.	11.22	11.65	11.39	10.98	12.11	12.30	11.80	11.20
	28	11.62	12.10	11.82	11.32	12.30	12.60	11.92	11.32
	29	11.50	12.00	11.68	11.12	12.30	12.60	11.98	11.38
	30	11.08	11.58	11.28	10.78	11.80	12.10	11.48	10.88
	31	10.95	11.38	11.05	10.50	11.38	11.70	11.25	10.75
1960 Jan.	1	Holiday	--	--	--	--	--	--	--
	Ave.	11.29	11.76	11.46	10.93	11.94	12.25	11.66	11.08
	4	10.88	11.32	11.10	10.60	11.75	12.00	11.62	10.50
	5	11.20	11.70	11.40	10.90	11.88	12.25	12.00	11.50
	6	11.38	11.95	11.65	11.12	12.30	12.68	12.38	11.88
	7	11.38	11.88	11.60	11.05	12.12	12.50	12.12	11.55
	8	11.25	11.68	11.35	10.82	12.18	12.48	12.18	11.68
	Ave.	11.22	11.71	11.42	10.90	12.05	12.38	12.06	11.42
	11	11.50	12.08	11.80	11.25	12.62	12.88	12.62	12.12
	12	11.70	12.18	11.88	11.32	12.38	12.68	12.50	12.00
	13	11.75	12.38	12.05	11.45	12.92	13.12	12.90	12.45
	14	12.00	12.62	12.30	11.70	12.92	13.12	12.90	12.50
	15	12.00	12.62	12.30	11.75	12.92	13.18	13.00	12.62
	Ave.	11.79	12.38	12.07	11.49	12.75	13.00	12.78	12.34

rior		Chicago				Sioux City			
220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
11.52	11.02	12.00	12.25	11.80	11.38	11.75	12.08	11.95	11.38
11.35	10.82	12.18	12.42	11.92	11.50	11.75	11.88	11.75	11.25
11.30	10.68	12.12	12.38	11.92	11.35	11.62	11.62	11.55	11.25
11.15	10.55	12.00	12.25	11.88	11.25	11.62	11.68	11.62	11.25
11.25	10.78	12.00	12.30	11.80	11.20	11.68	11.80	11.68	11.25
11.31	10.77	12.06	12.32	11.86	11.34	11.68	11.81	11.71	11.28
11.40	10.82	12.12	12.38	11.92	11.38	11.75	11.88	11.80	11.50
11.35	10.82	11.95	12.12	11.65	11.05	11.75	11.88	11.75	11.50
11.35	10.85	11.95	12.12	11.70	11.05	11.88	12.18	12.18	12.00
11.45	11.42	12.42	12.60	11.92	11.32	12.00	12.38	12.38	11.88
--	--	--	--	--	--	--	--	--	--
11.39	10.98	12.11	12.30	11.80	11.20	11.84	12.08	12.03	11.72
11.82	11.32	12.30	12.60	11.92	11.32	12.25	12.62	12.62	12.25
11.68	11.12	12.30	12.60	11.98	11.38	12.38	12.88	12.88	12.50
11.28	10.78	11.80	12.10	11.48	10.88	11.88	12.12	12.00	11.62
11.05	10.50	11.38	11.70	11.25	10.75	11.50	11.75	11.75	11.12
--	--	--	--	--	--	--	--	--	--
11.46	10.93	11.94	12.25	11.66	11.08	12.00	12.34	12.31	11.87
11.10	10.60	11.75	12.00	11.62	10.50	11.62	11.88	11.75	11.12
11.40	10.90	11.88	12.25	12.00	11.50	11.88	12.12	12.12	11.88
11.65	11.12	12.30	12.68	12.38	11.88	12.25	12.62	12.50	12.25
11.60	11.05	12.12	12.50	12.12	11.55	11.88	12.38	12.38	12.00
11.35	10.82	12.18	12.48	12.18	11.68	12.12	12.38	12.38	12.00
11.42	10.90	12.05	12.38	12.06	11.42	11.95	12.28	12.23	11.85
11.80	11.25	12.62	12.88	12.62	12.12	12.12	12.38	12.38	12.18
11.88	11.32	12.38	12.68	12.50	12.00	12.12	12.42	12.42	12.25
12.05	11.45	12.92	13.12	12.90	12.45	12.62	12.88	12.88	12.55
12.30	11.70	12.92	13.12	12.90	12.50	12.75	12.88	12.88	12.75
12.30	11.75	12.92	13.18	13.00	12.62	13.00	13.38	13.38	13.18
12.07	11.49	12.75	13.00	12.78	12.34	12.52	12.79	12.79	12.58

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Jan.	18	12.30	12.92	12.62	12.12	13.12	13.38	13.12	12.75
	19	12.42	13.05	12.75	12.75	13.38	13.62	13.40	13.00
	20	12.38	12.88	12.58	12.08	13.00	13.25	13.05	12.60
	21	12.25	12.82	12.55	12.00	13.00	13.38	13.10	12.75
	22	12.62	13.25	12.95	12.38	13.00	13.38	13.25	12.95
	Ave.	12.39	12.98	12.69	12.27	13.10	12.40	13.18	12.81
	25	12.70	13.25	12.98	12.38	13.38	13.62	13.55	13.25
	26	12.62	13.08	12.80	12.25	13.00	13.38	13.25	13.00
	27	12.62	13.05	12.78	12.22	13.12	13.55	13.32	13.08
	28	12.62	13.05	12.82	12.45	13.38	13.82	13.68	13.40
	29	12.50	13.05	12.82	12.45	13.08	13.52	13.42	13.20
	Ave.	12.61	13.10	12.84	12.35	13.19	13.58	13.44	13.19
Feb.	1	12.30	12.88	12.65	12.78	13.25	13.70	13.58	13.30
	2	12.30	12.88	12.65	12.28	13.00	13.38	13.28	13.95
	3	12.30	12.88	12.65	12.28	13.08	13.45	13.32	13.00
	4	12.45	12.95	12.75	12.35	13.00	13.38	13.32	13.00
	5	12.45	13.00	12.75	12.45	13.38	13.88	13.75	13.50
	Ave.	12.36	12.92	12.71	12.43	13.14	13.56	13.45	13.15
	8	12.30	12.88	12.65	12.25	13.38	13.82	13.58	13.38
	9	12.45	13.00	12.80	12.40	13.38	13.70	13.62	13.38
	10	12.68	13.12	12.92	12.55	13.55	13.88	13.82	13.55
	11	--	--	--	--	--	--	--	--
	12	12.50	13.08	12.85	12.45	13.50	13.82	13.82	13.55
	Ave.	12.48	13.02	12.80	12.41	13.45	13.80	13.71	13.46
	15	12.62	13.12	12.72	12.60	13.50	13.82	13.78	13.60
	16	12.68	13.18	13.02	12.62	13.38	13.82	13.78	13.70
	17	12.62	13.08	12.88	12.48	13.38	13.82	13.78	13.62
	18	12.55	13.12	12.92	12.52	13.30	13.68	13.62	13.48
	19	12.60	13.12	12.98	12.55	13.50	14.08	14.00	13.78
	Ave.	12.61	13.12	12.94	12.55	13.41	13.84	13.79	13.64

erior			Chicago				Sioux City			
#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
2	12.62	12.12	13.12	13.38	13.12	12.75	13.50	13.62	13.62	13.25
5	12.75	12.75	13.38	13.62	13.40	13.00	13.75	13.88	13.75	13.62
8	12.58	12.08	13.00	13.25	13.05	12.60	13.38	13.62	13.62	13.38
2	12.55	12.00	13.00	13.38	13.10	12.75	13.30	13.62	13.80	13.30
5	12.95	12.38	13.00	13.38	13.25	12.95	13.50	13.38	13.62	13.38
8	12.69	12.27	13.10	12.40	13.18	12.81	13.49	13.62	13.68	13.39
5	12.98	12.38	13.38	13.62	13.55	13.25	13.50	13.62	13.62	13.25
8	12.80	12.25	13.00	13.38	13.25	13.00	13.25	13.25	13.25	13.00
5	12.78	12.22	13.12	13.55	13.32	13.08	13.25	13.38	13.25	13.00
5	12.82	12.45	13.38	13.82	13.68	13.40	13.38	13.62	13.62	13.25
5	12.82	12.45	13.08	13.52	13.42	13.20	13.12	13.38	13.38	13.05
0	12.84	12.35	13.19	13.58	13.44	13.19	13.30	13.45	13.42	13.11
8	12.65	12.78	13.25	13.70	13.58	13.30	12.88	13.30	13.12	13.00
8	12.65	12.28	13.00	13.38	13.28	13.95	12.88	13.12	13.12	12.92
8	12.65	12.28	13.08	13.45	13.32	13.00	13.12	13.38	13.38	13.00
5	12.75	12.35	13.00	13.38	13.32	13.00	13.12	13.38	13.38	13.25
0	12.75	12.45	13.38	13.88	13.75	13.50	13.25	13.68	13.62	13.50
2	12.71	12.43	13.14	13.56	13.45	13.15	13.05	13.37	13.32	13.13
8	12.65	12.25	13.38	13.82	13.58	13.38	13.00	13.38	13.38	13.25
0	12.80	12.40	13.38	13.70	13.62	13.38	13.12	13.68	13.68	13.62
2	12.92	12.55	13.55	13.88	13.82	13.55	13.50	14.12	14.12	13.88
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8	12.85	12.45	13.50	13.82	13.82	13.55	13.12	13.70	13.75	13.38
2	12.80	12.41	13.45	13.80	13.71	13.46	13.18	13.72	13.73	13.53
2	12.72	12.60	13.50	13.82	13.78	13.60	13.62	14.12	14.12	13.75
8	13.02	12.62	13.38	13.82	13.78	13.70	13.50	13.88	13.88	13.42
8	12.88	12.48	13.38	13.82	13.78	13.62	13.50	14.12	14.12	13.88
2	12.92	12.52	13.30	13.68	13.62	13.48	13.25	13.88	13.88	13.50
2	12.98	12.55	13.50	14.08	14.00	13.78	13.62	14.12	14.12	13.75
2	12.94	12.55	13.41	13.84	13.79	13.64	13.50	14.02	14.02	13.66

Table 29. (Continued)

Date		Interior				Chicago			
		180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
Feb.	22	12.92	13.38	13.22	12.12	14.12	14.62	14.45	14.10
	23	13.18	13.62	13.40	13.02	13.88	14.38	14.32	14.12
	24	12.92	13.38	13.22	12.85	13.75	14.25	14.25	13.88
	25	12.80	13.32	13.15	12.78	13.62	14.12	14.05	13.62
	26	13.18	13.75	13.52	12.90	14.38	14.88	14.82	14.68
	Ave.	13.00	13.49	13.30	12.87	13.95	14.45	14.38	14.08

erior			Chicago				Sioux City			
	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#	180-200#	200-220#	220-240#	240-270#
8	13.22	12.12	14.12	14.62	14.45	14.10	14.00	14.42	14.42	13.75
2	13.40	13.02	13.88	14.38	14.32	14.12	14.12	14.62	--	14.25
8	13.22	12.85	13.75	14.25	14.25	13.88	14.00	14.38	14.50	14.25
2	13.15	12.78	13.62	14.12	14.05	13.62	13.75	14.12	14.05	13.88
5	13.52	12.90	14.38	14.88	14.82	14.68	14.25	14.88	14.88	14.68
9	13.30	12.87	13.95	14.45	14.38	14.08	14.02	14.48	14.46	14.16

Table 30. Average market price, in dollars per 100 pounds, for slaughter hogs by weight classes, by weeks, and by days, 74 firms, six-week survey[a]

Week and day	180-200#	200-220#	220-240#	240-270#
Week 1				
Monday	12.94	13.45	13.39	13.14
Tuesday	13.05	13.52	13.45	13.21
Wednesday	13.11	13.54	13.48	13.27
Thursday	12.95	13.43	13.33	13.16
Friday	13.02	13.39	13.33	13.14
Week 2				
Monday	13.01	13.40	13.26	13.17
Tuesday	12.91	13.36	13.33	13.17
Wednesday	12.74	13.25	13.21	13.01
Thursday	12.92	13.29	13.26	13.05
Friday	13.07	13.46	13.41	13.09
Week 3				
Monday	11.49	11.92	11.81	11.27
Tuesday	11.44	11.99	11.83	11.38
Wednesday	11.56	12.03	11.84	11.42
Thursday	11.58	12.00	11.86	11.42
Friday	11.36	11.93	11.70	11.24
Week 4				
Monday	11.56	11.98	11.85	11.37
Tuesday	11.54	12.00	11.81	11.36
Wednesday	11.41	11.92	11.73	11.26
Thursday	11.44	11.90	11.70	11.22
Friday	11.47	11.88	11.71	11.14
Week 5				
Monday	12.99	13.37	13.27	12.92
Tuesday	12.94	13.39	13.22	12.84
Wednesday	13.03	13.33	13.18	12.83
Thursday	12.98	13.37	13.20	12.85
Friday	12.96	13.42	13.28	12.87
Week 6				
Monday	13.33	13.60	13.45	13.20
Tuesday	13.09	13.56	13.43	13.06
Wednesday	13.17	13.65	13.55	13.20
Thursday	13.56	13.90	13.74	13.37
Friday	13.50	13.98	13.86	13.47

[a]The dates of the survey were: Sept. 14-19, 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, 22-27, 1960 (price data were omitted for Saturdays).

Table 31. Average market price, in dollars per 100 pounds, for slaughter hogs by weeks and weight classes, 74 firms, six-week survey[a]

Week	180-200#	200-220#	220-240#	240-270#
1	13.02	13.46	13.40	13.19
2	12.93	13.35	13.29	13.10
3	11.48	11.97	11.81	11.35
4	11.48	11.94	11.76	11.27
5	12.96	13.38	13.23	12.86
6	13.33	13.74	13.61	13.26

[a]The dates of the survey were: Sept. 14-19, Sept. 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, Feb. 22-27, 1960 (price data were omitted for Saturdays).

Table 32. Average market price, in dollars per 100 pounds, for slaughter hogs, by areas and weight classes, 74 firms, six-week survey[a]

Area	180-200#	200-220#	220-240#	240-270#
1	13.06	13.28	13.25	12.93
2	12.35	12.85	12.68	12.37
3	12.19	12.80	12.62	12.21

[a]The dates of the survey were: Sept. 14-19, Sept. 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, Feb. 22-27, 1960 (price data were omitted for Saturdays).

Table 33. Average market price, in dollars per 100 pounds, for slaughter hogs, by days and by weight classes, 74 firms, six-week survey[a]

Day	180-200#	200-220#	220-240#	240-270#
Monday	12.55	12.95	12.84	12.51
Tuesday	12.50	12.97	12.85	12.50
Wednesday	12.50	12.96	12.83	12.50
Thursday	12.56	12.98	12.85	12.51
Friday	12.56	13.01	12.88	12.49

[a]The dates of the survey were: Sept. 14-19, Sept. 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, Feb. 22-27, 1960 (price data were omitted for Saturdays).

Table 34. Average market price, in dollars per 100 pounds, for slaughter hogs by weight classes, by areas, and by days, 74 firms, six-week survey[a]

Area and day	180-200#	200-220#	220-240#	240-270#
Area 1				
Monday	13.04	13.27	13.30	13.00
Tuesday	13.00	13.24	13.18	12.90
Wednesday	13.06	13.30	13.24	12.90
Thursday	13.04	13.25	13.23	12.87
Friday	13.19	13.34	13.31	12.96
Area 2				
Monday	12.44	12.83	12.61	12.34
Tuesday	12.29	12.85	12.73	12.39
Wednesday	12.35	12.80	12.66	12.37
Thursday	12.31	12.87	12.70	12.40
Friday	12.36	12.89	12.69	12.35
Area 3				
Monday	12.19	12.76	12.60	12.20
Tuesday	12.20	12.82	12.64	12.22
Wednesday	12.10	12.77	12.60	12.22
Thursday	12.32	12.83	12.63	12.26
Friday	12.15	12.80	12.65	12.17

[a]The dates of the survey were: Sept. 14-19, Sept. 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, Feb. 22-27, 1960 (price data were omitted for Saturdays).

Table 35. Average market price, in dollars per 100 pounds, for slaughter hogs by weight classes, by weeks and by areas, 74 firms, six-week survey[a]

Week and area	180-200#	200-220#	220-240#	240-270#
Week 1				
Area 1	13.36	13.64	13.71	13.60
Area 2	12.84	13.39	13.29	13.10
Area 3	12.85	13.37	13.19	12.86
Week 2				
Area 1	13.29	13.53	13.63	13.48
Area 2	12.84	13.33	13.23	13.15
Area 3	12.66	13.19	13.02	12.66
Week 3				
Area 1	12.03	12.24	12.05	11.54
Area 2	11.33	11.83	11.66	11.20
Area 3	11.10	11.85	11.72	11.29
Week 4				
Area 1	12.05	12.19	12.03	11.46
Area 2	11.45	11.84	11.60	11.18
Area 3	10.96	11.78	11.65	11.17
Week 5				
Area 1	13.66	13.84	13.83	13.51
Area 2	12.54	13.17	12.95	12.60
Area 3	12.69	13.12	12.91	12.48
Week 6				
Area 1	14.01	14.24	14.25	13.96
Area 2	13.09	13.52	13.32	12.99
Area 3	12.89	13.46	13.24	12.82

[a]The dates of the survey were: Sept. 14-19, Sept. 21-26, Nov. 30-Dec. 5, Dec. 7-12, 1959; Feb. 15-20, Feb. 22-27, 1960 (price data were omitted for Saturdays).